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**Bulletin of
University of Minnesota**

COLLEGE OF EDUCATION

Educational Monograph No. 6

**INDUSTRIAL EDUCATION
IN THE
PUBLIC SCHOOLS OF MINNESOTA**

(A Detailed Study of Its History and Present Practice,
with Suggestions)

BY

HOMER J. SMITH, M.A.

Department of Trade and Industrial Education, University of Minnesota



Vol. XXVII No. 47 September 15, 1924

Price: \$1.00

Entered at the post-office in Minneapolis as second-class matter,
Minneapolis, Minnesota

Acceptance for mailing at special rate of postage provided for in section 1103,
Act of October 3, 1917, authorized July 12, 1918.

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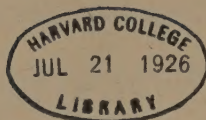
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FOREWORD

This study was suggested to Professor Smith by the writer because the University of Minnesota, although designated by federal and state authorities to train teachers in the field of trade and industrial education, has been without a clearly defined program in that field. To be sure, since 1917, when the Smith-Hughes law became effective, and even before that time, the University has given courses the titles of which indicate a relationship to the field of industrial education. That the content of such courses really fulfilled the titular suggestion has not been a demonstrable fact. Rather was it clear that the field of general education, its aims, its principles, and its methods had been laid under tribute for an over-generous supply of content for what pretended to be a very specialized field of teacher-training.

The obvious evils of this situation were fourfold. *First*, it confused students in the selection of courses and in a discriminating appreciation of the material which they studied. *Second*, it enabled students to multiply college credits by enrolling for both general and what appeared to be specialized courses although the course content was largely the same. *Third*, it prevented the clearly intentioned development of well-defined curricula for training trade and industrial teachers. *Fourth*, it increased the University's teacher-training costs because the same material was repeated by different instructors.

The prevailing ambiguity on the part of the faculty, not alone in defining the content of a particular course but in the preparation of a teacher-training curriculum, left the student vaguely-minded and uncertain about the aims, the processes, and the means of his professional training. Faculty conferences designed to improve the situation were always conditioned and usually stranded on a generous ignorance of what was going on in the industrial departments of Minnesota schools. What are these students whom we presume to train called upon to know and to do, once they have left the University and are employed by Minnesota boards of education for service?

The detailed information implied by this question cannot be gained at long range. It seemed, therefore, the simplest wisdom and an obvious first step in the development of a defensible training program to make a systematic inquiry as to current practice in the schools. Peculiar propriety inhered in the proposal to apply the methods of occupational analysis, which industrial education has done so much to develop, to the problem of teacher-training in this field and Professor Smith was commissioned to undertake the task. It was with the express approval of both the state and federal boards, that he was released from a portion of his teaching duties at the University for the year 1923-24 for this special investigation. The nature and methods of his work and the conclusions drawn from his investigation will be apparent from the report which follows.

It would be an error to attach too great a degree of finality to this investigation or to any proposed teacher-training program based thereon. *Current* practice, important as it is, is not necessarily the *best* practice and nothing is more certain than that Minnesota schools will evolve through the years an ever better program of specialized training designed to fit boys and girls for industrial and commercial work. The details of this evolution, and possibly even its direction, may not be apparent now. Any teacher-training curriculum which the University of Minnesota may adopt as the result of this study must keep the way open for continuous readjustment to the changing activities which society exacts from its public schools, and the University must keep itself vital by constant contact with these changes as they occur.

The use of occupational analysis as a basis for formulating a teacher-training program seems fairly easy of application in the field of industrial education, because of the absence of traditions. Reflection on the possibilities of the method suggests its availability in other fields. Prospective teachers of academic high school subjects, and young teachers in the first years of their experience feel a definite unreality in the university courses designed to train them for teaching. Numerous reasons may be adduced for this almost universal state of mind on the part of the graduates of our university training schools, but the institution

bears the responsibility of self-analysis with a view to paving the morass between "theory" and "practice" with more secure walks and highways. The first step toward improvement is a better understanding, not intuitive and experiential, but objective and scientific, of what the teacher's job really is. What are the skills, what is the information, and what are the attitudes demanded by the job of teaching? These questions must be answered in the terms of objective analysis for the teacher of English, the teacher of history, the high school principal, the school superintendent, and for every other educational task which is specialized in character. This study by Professor Smith has, therefore, a wider significance than the narrow field of trade and industrial education. It may be regarded as a type study¹ suggestive not merely of further studies in this field but of similar studies in a wide range of fields.

A word may here be said of the generous co-operation of the Minnesota State Board of Vocational Education and its executive officers, Mr. E. M. Phillips and Mr. Dean M. Schweickhard, in the promotion of this investigation. The proposal for the study was received from the first with generous approval and the utmost co-operation was given at every step of the work. The clear recognition that in the Smith-Hughes fields, the University was faced with pioneering problems has led the State Board to accord wide latitude to the University in the use of Smith-Hughes teacher-training funds—an attitude of fundamental significance for the rapid evolution of our work, and one worthy of great praise.

M. E. HAGGERTY,
Dean, College of Education.

¹ Similar studies have been sponsored at the University of Minnesota as follows:

IN PRINT:

- Armstrong, F. E. Farm Repair and Construction Work. 1923.
- Dickinson, Sherman. Training in service for teachers of Agriculture. 1923.
- Hutson, P. W. Training of the High School Teachers of Minnesota. 1923.
- Koos, L. V. The High School Principal. Houghton Mifflin Co. 1924.

IN PROGRESS:

- Dickinson, Sherman. An Analysis of the Essential Facts Involved in a High School Curriculum in Dairy Husbandry.
- Inglis, Rewey Belle. An Analysis of the Skills, Information and Intellectual Backgrounds Needed by English Teachers in Minnesota High Schools.
- Lathrop, F. W. An Analysis of the Information and Skills Needed by the High School Teacher of Agriculture in the Field of Oat-Raising.

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INTRODUCTION

The study here reported was made with primary purpose to determine the responsibilities of the College of Education in teacher-training for the industrial and vocational positions of this state. There was appreciation, also, of the fact that closer acquaintance on the part of the writer with teachers and with the conditions of their service would be reflected in improved classroom presentations in the department and more appropriate responses to the increasing requests for help which come by mail. The report is not intended to be a syllabus nor to define the units of instruction, but it should influence proper expansion of offering and desirable uniformity in certain aspects of the work. It gives opportunity for comparison of teaching situations and practices; equipment, course materials, and product; methods and management; and the emphasis placed upon the several objectives entertained by schools and departments. Teachers may regret the omission of suggestive course outlines and reference lists. They are reminded that our special literature abounds in these helps and that the State Department of Education has issued printed suggestions and is desirous of being of further assistance in cases of peculiar difficulty. In the preparation of the bulletin there has been kept foremost the wish to aid administrators and supervisors and to provide a reading in the subject for those in training, more especially those to whom industrial education is but one of many phases of study.

The methods of the study are but two—examination of printed matter and personal visitation. Much time was spent upon the unpublished records of the State Department of Education, the inspector's annual reports on state high and state graded schools, the rules of the High School Board, school laws and rules relating to buildings and aid, and industrial education literature from which were gleaned comparative or supporting data. From these sources we learned history, noted important trends, and determined the factors of influence. Visits were made of from one to four days duration in sixty-five representative systems of the state in the school year which closed in June, 1923. Three hundred

forty-nine interviews were had and the work of one hundred ten industrial teachers was observed. No formal blanks of inquiry were used but check sheets were carried that the information and impressions gained might be identical and complete for each school visited. Interest in the study was everywhere manifest and all persons met gave cordial and thoro co-operation. By reason of their efforts to provide and to explain and to open to inspection all that seemed necessary for close analysis the work was a pleasant experience and the data are more complete than was anticipated.

Acknowledgement of great help is due various members of the official and clerical staff of the state commissioner of education, particularly to Mr. Dean M. Schweickhard, state supervisor of trade and industrial education. A seminar group for the study of vocational problems, under the leadership of Dr. C. A. Prosser, have heard portions of the findings reported and have given helpful reactions. Two of the writer's lecture groups have had presented to them the outlines and many details of the study and they have unconsciously influenced the arrangement of materials and the assignment of space. Mr. Melvin Haugen, graduate student of education, contributed much by careful work on many of the tabulations. To several of my colleagues I owe a debt for criticism and to Dr. L. V. Koos, professor of secondary education, a very great debt for early help in the conception of the problem and an appraisalment of the conditions proposed to be canvassed. Had interest in the project on the part of Dean Haggerty been less extreme, the observation of teachers at work, which is the study's greatest factor of validity, would have been impossible.

HOMER J. SMITH.

CHAPTER I

THE GROWTH OF INDUSTRIAL WORK IN THE PUBLIC SCHOOLS DURING THIRTY YEARS

A. THE INCREASE IN HIGH SCHOOL INDUSTRIAL DEPARTMENTS

In the school year 1893-94 manual training was reported as offered in four cities and in seven high schools of the state, namely, in four high schools of Minneapolis, in the Mechanic Arts High School of St. Paul, and in the high schools of Duluth and Stillwater. Expansion was slow in these early years, there being but fourteen towns in the list at the end of a ten-year period. From 1903-4 to 1913-14, the second decade, the most noticeable extension was made, for these years witnessed a rise from fourteen to two hundred towns offering special courses for boys in grades and high school. State aid being inaugurated in 1909-10 and being maintained with the exception of one school year to the present, there has been a gradual extension of the offering.

The accompanying table in so far as it has been possible accurately to complete it, gives one an idea of the manner in which the introduction of industrial departments strove to keep pace with the widening provision of secondary education. Mere mention is made here of three facts which extend our general conception of growth but which could only with great difficulty have been more definitely expressed:—the work has been carried on in many high school departments in the state graded schools; some work has been done in rural schools associated with the high schools of their districts, and several four-year high schools have not been credited in our tables because, being unaided, they were not required to file special reports with state officers. Some factual materials on these activities will be presented later in connection with *State Aid* and *Students Served*.

TABLE I
INCREASE IN INDUSTRIAL DEPARTMENTS IN THE FOUR-YEAR HIGH SCHOOLS
DURING THIRTY YEARS^a

Year Ending June	Number Schools on High School List	Number Having Industrial Departments	Per Cent Having Industrial Departments
1894	80	4	5.0
1895	86	5	5.8
1896	88	7	7.9
1897	92	7	7.6
1898	97	7	7.2
1899	109	7	6.4
1900	115	7	6.1
1901	130	10	7.7
1902	141	10	7.0
1903	152	14	9.2
1904	162	16	9.7
1905	174	17	9.7
1906	192	20	10.4
1907	201	34	16.9
1908	206	63	30.5
1909	208	92	44.2
1910	207	108	52.1
1911	207	126	60.8
1912	211	148	70.1
1913	216	185	85.6
1914	216	200	92.5
1915	221	192	86.8
1916	230	183	79.5
1917	230	188	81.7
1918	233	168	72.1
1919	236	137	58.0
1920	240	183	76.2
1921	243	183	75.3
1922	246	177	71.5
1923	248	176	70.9

^a Data from annual reports of the inspectors of high schools and from reports of superintendents and principals, (unpublished) filed with the state commissioner of education.

The number of departments aided will later be shown to have increased rapidly from ten to one hundred seventy-eight and it will likewise be noted that the effect of omission of aid in one year (1917-18) has not been completely overcome. The reversal was perhaps not so much effected by the loss of the award, then \$600, as by the feeling that those in administrative authority and representative privilege had lost faith in the merits of these special courses. Superintendents and school boards "sat tight" and many of them endeavored to "get out from under." But the return has been steady and we seem now to have reached the time when there is less of conjecture about the need of industrial courses in the program. We shall hope that the types of work now encouraged by the State Department of Education, with their changed emphasis, may appeal to most administrators as justifying the requirements in time, space, and money.

B. THE INCREASE IN INDUSTRIAL COURSE ENROLMENT

It would have been a source of great satisfaction to have introduced at this point a table showing the full growth of enrolment in all manual training courses for both grades and high schools during the thirty years. This was impossible for three reasons:—grade enrolment in industrial courses in our three largest cities does not appear in the reports of inspectors; in most cases only state aided schools are reported in detail; and it was often difficult to determine which of two conflicting entries to accept, they having been arrived at by different plans of accounting or from slightly different sources.

It is possible, however, to show high school industrial enrolment in the two subjects most commonly offered; which figures, altho not portraying the actual condition, will indicate with some clearness the extent and steadiness of the increase. Woodwork and mechanical drawing are shown in separate columns (Table II) but totals were omitted. (The totals should not be used for comparative purposes as there was doubtless much overlapping.) Other subjects (ironwork, free-hand drawing, farm mechanics, carpentry, etc.) have been omitted because in the earlier years the term *manual training* comprehended for record purposes all of the industrial activities of the school program.

TABLE II
THE INCREASE IN HIGH SCHOOL INDUSTRIAL ENROLMENT SINCE 1895^a

Year Ending June	Woodwork	Mechanical Drawing
1895	678	705
1900	745	864
1905	2189	1520
1910	4770	3866
1915	6985	5070
1916	7483	6047
1917	7827	6145
1918	5066	4704
1919	5129	3612
1920	6593	5396
1921	6244	5748
1922	7109	5705

^a Data on state high schools and high school departments in state graded schools from inspectors' annual reports and from unpublished annual reports of principals, and superintendents, filed with the state commissioner of education. See text on omission of other shop subjects.

The numbers enrolled for woodwork are perhaps the most useful because, whatever the offering, the woodwork courses were assumed to be essential as first courses. The drawing enrolment makes an interesting complement because we learn that in some of the years it exceeded the shop enrolment. The reader will excuse the seeming readiness to dismiss from consideration the numbers of students enrolled in shop courses other than woodwork upon assurance that facts of these activities will be presented later. It has been found more appropriate as well as more accurate to record the coming of new experiences in terms of schools offering them, by years, rather than in terms of numbers of students pursuing them.

There is reason to believe that there was a more constant growth of industrial enrolment than appears from an examination of the table. Instead of the wavering enrolment indicated in the first woodwork column we would have an advance as steady as later figures reveal had we been able to record the numbers pursuing the new subject of "ironwork" as it then took its place in the school. While the total numbers increased,

the number for woodwork was lowered by the enrolment in "ironwork." No adequate data are at hand either to show the importance of the "short course" service which was stressed during most of these thirty years and by reason of which large numbers were instructed in farm mechanics, agricultural carpentry, and forge practice. Facts supplementing the data justify our belief that from its introduction in this state the industrial work has progressed steadily, if rather slowly, both in the number of schools offering courses and in the number of students served in each school.

C. THE EXPANSION OF EXPERIENCES OR SHOP SUBJECTS

Interesting as is the growth of departments and course enrolment it is even more interesting to find with what tardiness it has been realized that the interests and needs of youth and adults are not met completely by courses in woodwork and drawing alone. *Ironwork* or *forging* had gained a considerable acceptance before the Putnam Act required its inclusion in the offering but to that date (1909-10) little work was done in other types of industrial activity. Certain courses, particularly *art metal work* and *book-binding*, have been given trial in a school or two at a time but have not been able to hold place as unit subjects. They have been pushed down into the lower grades for handling by regular classroom teachers or have been accepted as valuable for special groups with teachers of special preparation. These do not appear in our record (Fig. 1). *Plumbing*, *oxyacetylene welding*, and *photography* have been attempted also in a very few schools, but do not seem to have established themselves.

Machine shop work, sheet metal work, electricity, auto repair, and printing have gained steadily and seem to have earned a permanent place in the state program. Wood-turning and carpentry, offered for a considerable time and to a great extent even today as part of the woodworking courses, have now come to be given as units for separate enrolment in many schools. The formation of special girls' classes, never a practice in more than five schools, has completely gone, tho in many places the work, particularly drawing, is made an elective for girls in the high school. Some relation may exist also between the fact of these

earlier feminine groups and the present practice of offering woodwork to young women of the high school normal training classes who will make use of elementary skills and appreciations in their rural school teaching positions.

FIGURE 1

THE INTRODUCTION OF NEW SUBJECTS, BY YEARS, AND THE SUBSEQUENT INCREASE OF SCHOOLS OFFERING EACH SUBJECT*

Subjects and Years	School Year ending June																														
	1894	1895	1896	1897	1898	1899	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	
Bench Woodwork	4	5	7	7	7	7	10	10	14	16	17	20	34	65	92	108	126	148	185	200	192	183	168	137	163	183	177	177	177	177	
Mechanical Drawing	3	4	6	6	6	6	9	10	13	15	16	20	32	61	90	102	121	142	180	194	180	176	185	165	134	172	173	177	177	177	
Forging				1	3	4	5	7	9	10	10	10	12	14	15	15	16	20	20	23	24	25	19	16	15	13	17	21	18	16	
Wood Turning										1	1	1	3	3	4	6	9	9	10	12	20	11	15	20	18	16	24	23	20	20	
Machine Shop Practice										1	1	1	2	3	3	3	4	5	5	6	7	8	9	9	10	10	13	13	14	14	
Carpentry												1			1	1	3	3	7	7	8	10	12	7	9	10	9	10	11	12	12
Automobile Mechanics												1				1	1			1		1	3	3	2	4	5	10	11	14	17
Cement, etc.																1	2	1	1	1	1	3	2	3	2	2	2	2	3	5	
Architectural Drawing																	2	3	5	7	4	4	7	8	11	14	21	33	30	30	
Foundry Work																					2	3	3	3	3	3	3	3	4	4	
Pattern-Making (Wood)																						3	4	6	6	5	5	5	6	6	
Sheetmetal Work																						1	2	2	2	1	3	4	7	9	
Printing																							1	3	3	3	5	8	9	11	14
Millwork (Wood)																							1	2	2	2	3	4	4	4	
Electricity																							2	2	3	3	4	5	9	12	
Machine Design																								2	3	3	5	5	6	6	
Home Mechanics																												2	3	3	5

Note
 — The numbers above lines in the year column (vertical) indicate how many schools offered any selected type of shop work in any selected year.
Example: Three schools offered Automobile Mechanics in 1915

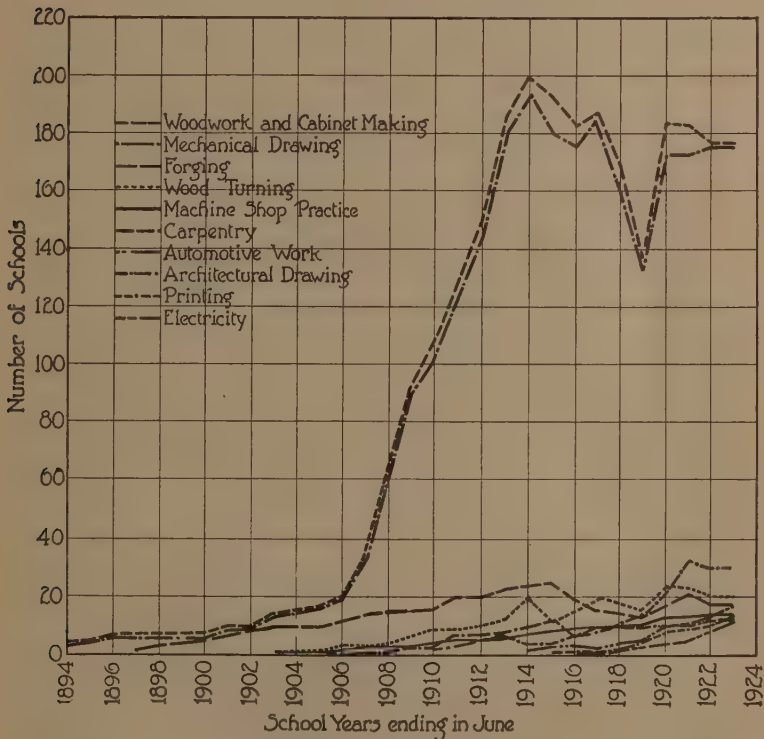
* Data from inspectors' annual reports (high schools and state graded schools) and from unpublished annual reports of principals and superintendents, made to the state commissioner of education.

Figure 1, designed to show the comparative dates of the introduction of courses, even tho supplemented to indicate the numbers of schools offering each subject in each year, does not suffice to show "expansion of experiences." For this purpose Figure 2 has been prepared from the same data. It brings out with clearness the facts that woodwork and mechanical drawing

still constitute a very great part of the industrial offering and that what new subjects we have are being experimented with in but few schools. Discussion will be made in later chapters of the relative merits of the various courses but one cannot pass this point without statement of two beliefs: (1) that we should

FIGURE 2

THE EXPANSION OF EXPERIENCES OR SHOP SUBJECTS. GROWTH IN THE NUMBERS OF SCHOOLS INTRODUCING EACH OF TEN SELECTED COURSES



greatly extend the newer subjects if we are to realize our more common school or departmental objectives; and (2) that we have no evidence to show that woodwork and mechanical drawing deserve first place in schools of limited offering. In our decisions as to *how many shop subjects to offer and which ones should take precedence* we are influenced by tradition. The writer feels that

were the cost factor eliminated the conditions would not be so disconcerting; he hopes to show, as this paper proceeds, that a good industrial offering is worth all that it costs and that greater returns can be had with little additional outlay.

D. THE GRADES PARTICIPATING IN SPECIAL COURSE WORK

Table III shows us the changes which have taken place in the past ten years in the selection of grades to be given special industrial instruction. There has been a gradual discontinuance in grades three, four, five, and six and a corresponding increase, not quite so marked, in the two upper years of the high school. The first of these changes is due largely to the standards set up to be met for state aid and the second to the increasing breadth of offering and the wider choice of subjects allowed generally in secondary programs.

TABLE III

THE GRADES PARTICIPATING

(The numbers of schools scheduling industrial work in the several grades during ten years^a)

School Grades	School Year Ending June									
	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922
Third	2	1	1	1	1	No	0	0	0	0
Fourth	3	4	3	2	2	spe-	1	1	1	1
Fifth	29	30	29	15	19	cial	12	15	9	5
Sixth	43	65	74	50	96	data	21	30	28	21
Seventh ...	169	171	189	168	182	...	129	165	168	161
Eighth	171	174	190	170	186	No	131	169	171	162
Ninth	170	173	190	163	184	aid	128	170	169	171
Tenth	128	152	156	134	178	...	102	152	150	165
Eleventh ...	22	26	40	31	26	No re-	21	47	56	58
Twelfth ...	18	20	24	18	19	ports	14	31	33	29
Base No. ^b ..	185	200	192	183	188	168	137	183	183	177

^a Includes towns supporting high schools proper or high school departments in state graded schools. Data from same sources mentioned under two previous tables.

^b The numbers of schools, for each year, from which usable reports were available. The varying base numbers should be considered in reading through the years for any school grade.

We may assume that the industrial teacher will henceforth give his attention to boys above the sixth grade only and that there will be increasing enrolment in the eleventh and twelfth years. This gives us a span of seven years through which to

work, exclusive of the junior college probabilities. Introducing a later discussion it should be said here that this fact has significance for our teacher-training program, especially in the requirements of psychology, technique of teaching, and special methods.

E. THE INCREASE IN SALARIES OF INDUSTRIAL TEACHERS

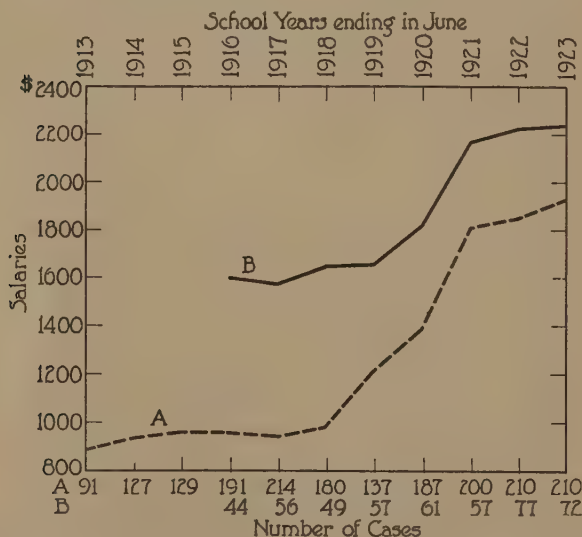
Study of the salaries of special industrial teachers during the past decade has been made with comparative ease because of the completeness of state inspectors' annual reports in this particular. Where these lists were not complete they were filled by use of the annual reports of principals and superintendents (unpublished) filed in the offices of the State Department of Education. Despite the fullness of data the method of combining them for our purposes was not easy of choice and may be open to criticism.

It has seemed appropriate to work upon the cases in dual classification. The high school industrial teachers of the three largest cities—Minneapolis, St. Paul, and Duluth—constitute one group and all industrial teachers of the state outside these three cities make a second list. In the first group it was possible to omit special supervisors who have no direct teaching duties and whose salaries would naturally raise the medians. In the second group all men were included, grades and high school alike, as well as those with supervisory responsibility mixed with actual classroom work. The typical person of this group instructs both grade and high school pupils and his salary is the one in which we are most interested in this study. Our entire discussion concerns the duties, preparation, and efficiency of men in the typical Minnesota situation.

Figure 3 shows that for both groups the increase has been accelerated by war conditions and that the tendency since the war has been gradually upward. As before stated these medians are slightly raised by the salaries of a few men in the larger towns and especially in the range towns, who serve in the teaching-supervisor capacity. The data are modified somewhat also by the extended school year in a number of schools but do not include moneys earned by evening school work or any extra-class service performed for the school system after school hours or during vacations. *It would be accurate to say, in consideration of*

these conditions not wholly apparent in the tables, that the median salary of all industrial teachers outside the three largest cities in the year 1922-23 was \$1850 and that the beginning salary, for that year, of men fresh from training, without experience, was close to \$1550. For high school industrial teachers in our three largest cities the median for that year was about \$2250.

FIGURE 3
THE SALARIES OF INDUSTRIAL TEACHERS IN MINNESOTA
(Median Salaries for the Past Decade)



- A. Grade and high school teachers in the state, exclusive of Minneapolis, St. Paul, and Duluth.
B. High school teachers in Minneapolis, St. Paul, and Duluth.

NOTE:—Figure should be read as follows: For 200 teachers of Group A, the median salary in 1921 was slightly above \$1800.

Figure 4 has been supplied, based on the average of salaries during eight years, so that percentages of teachers earning certain amounts may be known. For the sake of clearness and in recognition of the close interest of many administrators in salary facts in the special fields we include Table IV, which provides detail of cases at each \$100 interval of salary range, during eleven years, for our two teacher groups.

In comparison we have figures by Miss Sargeant¹ on salaries of elementary school teachers in 138 cities of all sizes and of high school teachers in 147 cities. The median elementary school salary is \$1375, and for the high school teachers, \$1823.

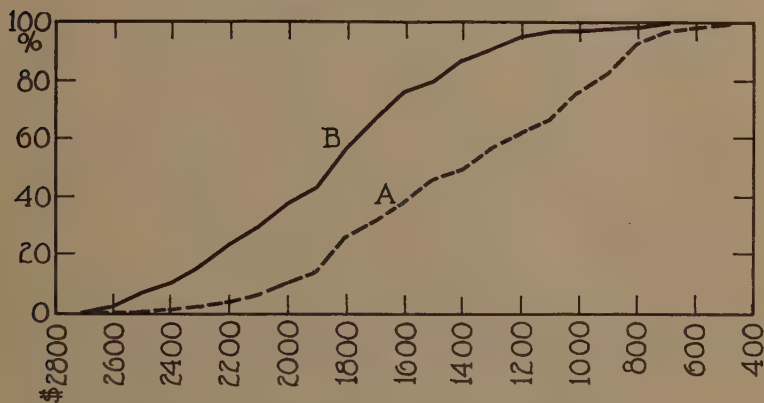
The Salary Committee of the National Education Association reported² in 1923 as follows: 86,568 city senior high school teachers received a median salary of \$2101; the median for 12,011 city junior high school teachers was \$1797; and that of 106,661 city elementary teachers was \$1633.

These comparative data support the writer's feeling that industrial teachers, tho their training be inferior, receive slightly more than the average teacher with whom they are associated.

FIGURE 4

INDUSTRIAL TEACHERS' SALARIES. PERCENT RECEIVING SALARIES AT OR ABOVE ANY SELECTED AMOUNT

(Average eight years, 1915-16 to 1922-23)



A and B groups as in Figure 3.

Figure should be read as follows: In Group A, fifty per cent of the men received an average salary of \$1400 or more during this eight-year period. Ten per cent received \$2000 or more. Twenty per cent received \$1850 or more.

¹ Sargeant, Ide G., Report of the Committee of Educational Progress, Salaries, Clerical and Supervisory Assistance. *Bulletin of the Department of Elementary School Principals, N. E. A.* 3:40-41. October, 1923.

² Teachers' salary trends during 1923. *Journal of N. E. A.* 12:307-8. October, 1923.

(Distribution in hundred-dollar intervals. Lowest, highest, and median salaries by years for a decade. Two groups, varying cases)

Salaries in \$100 Intervals	1912-13		1913-14		1914-15		1915-16		1916-17		1917-18		1918-19		1919-20		1920-21		1921-22		1922-23	
	Ia	Ib	Ia	Ib	Ia	Ib	Ia	Ib	Ia	Ib	Ia	Ib	Ia	Ib	Ia	Ib	Ia	Ib	Ia	Ib	Ia	Ib
\$ 500-599	3	..	..	8	1	..	1	..	1	..	1	..	2	..	..	..	..	..	..	..	..	..
600-699	11	9	8	6	6	..	5	..	5	..	3	..	6	..	..	..	..	..	..	..	..	..
700-799	17	20	19	31	..	..	33	..	33	..	18	..	3	..	..	..	..	..	..	..	..	..
800-899	15	24	21	39	..	..	48	..	48	..	33	..	8	..	..	..	..	..	..	..	..	..
900-999	15	29	29	36	1	..	41	..	41	..	44	..	12	..	..	..	..	..	..	..	..	..
1000-1099	9	17	23	20	..	..	23	..	23	..	20	..	22	..	..	..	..	..	..	..	..	..
1100-1199	6	6	9	12	5	..	12	..	12	..	12	..	12	..	..	..	..	..	..	..	..	..
1200-1299	10	13	10	16	3	..	16	..	16	..	11	..	13	..	..	..	..	..	..	..	..	..
1300-1399	3	8	6	14	1	..	13	..	13	..	12	..	11	..	..	..	..	..	..	..	..	..
1400-1499	2	..	4	4	8	..	8	..	8	..	4	..	5	..	..	..	..	..	..	..	..	..
1500-1599 .....	..	..	..	3	4	..	6	..	6	..	9	..	15	..	..	..	..	..	..	..	..	..
1600-1699 .....	..	1	..	2	6	..	2	..	2	..	7	..	15	..	..	..	..	..	..	..	..	..
1700-1799 .....	..	..	..	4	14	..	1	..	1	..	3	..	2	..	..	..	..	..	..	..	..	..
1800-1899 .....	..	..	..	2	1	..	3	..	14	..	6	..	7	..	..	..	..	..	..	..	..	..
1900-1999 .....	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..
2000-2099 .....	..	..	..	..	..	..	2	..	1	..	1	..	2	..	..	..	..	..	..	..	..	..
2100-2199 .....	..	..	..	..	..	..	..	..	1	..	1	..	1	..	..	..	..	..	..	..	..	..
2200-2299 .....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
2300-2399 .....	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
2400-2499 .....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
2500-2599 .....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
2600-2699 .....	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..
2700-2799 .....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
2800-2899 .....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
2900-2999 .....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
3000-3099 .....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
3100-3199 .....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
3200-3299 .....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
3300-3399 .....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Cases	91	127	129	191	44	..	214	..	56	..	180	..	137	..	187	..	200	..	210	..	210	..
Lowest	585	630	615	540	950	..	540	..	950	..	1050	..	500	..	778	..	787	..	720	..	810	..
Highest	1400	1617	1400	2300	2000	..	2080	..	2600	..	2000	..	2100	..	2850	..	3350	..	3250	..	3090	..
Median	896	936	957	951	1600	..	949	..	1588	..	980	..	1227	..	1395	..	1802	..	1850	..	1939	..

a I=All industrial teachers in all schools outside our three largest cities for whom data were available. See successive numbers of cases used

F. STATE AID AND THE MINIMUM REQUIREMENTS

The first law of Minnesota carrying aid in encouragement of industrial subjects in schools was the Putnam Act³ (1909) entitled,

An Act To Provide for the Establishment and Maintenance of Departments of Agriculture, Manual Training, and Domestic Economy in State High, Graded, and Consolidated Schools, and To Authorize Rural Schools To Become Associated with Such State Graded or High Schools and Making Appropriation Therefore.

This act appropriated \$25,000 a year for the establishment and maintenance of departments of agriculture, manual training, and domestic economy in *ten state high, graded, or consolidated schools to be selected* by the High School Board and to be listed for aid dependent upon the meeting of certain requirements.

Provision was made that no school was to receive aid to exceed two thirds of the amount actually expended for outfit and instruction, and the award was in no case to exceed \$2500.

The rules and regulations adopted by the High School Board called for the provision of one shop, one room for domestic science, one classroom, one laboratory, and a farm building sufficient to shelter seeds, tools, and children in case the plat of ground were remote from the high school building. There were to be three special instructors, one for each type of work mentioned, except that in rural consolidated schools the principal might give instruction in one subject. In determining aid there were to be considered the cost of instruction (whole or part time) equipment, supplies and seeds, labor and team work, reference facilities, and extension work in the associated schools. No part of the funds was to be expended for grounds or buildings.

The ten schools selected and aided during the school year closing in June of 1910 (Putnam schools) were Albert Lea, Alexandria, Canby, Cokato, Glencoe, Hinckley, Lewiston, McIntosh, Red Wing, and Wells.⁴ The respective superintendents of schools were E. M. Phillips, W. P. Dyer, E. C. Higbie, John Munroe, C. G. Selvig, A. E. Pickard, A. C. Loomis, A. M.

³ *Laws of 1909 ch. 247 (S. F. No. 218, p. 291 General Laws of Minnesota, 1919).*

⁴ *Seventeenth Annual Report of the Inspector of State High Schools for the Year Ending July 31, 1910.*

Dunton, John L. Silvernale, and Charles E. Young; and the men charged with instruction in manual training were M. L. Robbins, A. M. Faker, A. M. Kiser, A. H. Seidenberg, A. D. Bailey, Charles Robertson, Ervine Harland, Leo LeDuc, E. B. Dillingham, and C. R. Wilcox. (The salaries of the latter group ranged from \$675 to \$1200.) The enrolment in shop work in the ten schools during this first year (1909-10) totaled 233 high school students, 665 graded school students, and 148 short course students, or a grand total of 1046. The total amount expended by the ten was \$50,996 and the award from the state for this year was \$24,509, or less than the sum paid for salaries alone.

Two years later (1911) an amendment⁵ to the law of 1909 and a new statute, the Benson-Lee Acts,⁶ which held out still further encouragement, were approved.

This new provision offered \$1000 each year to schools maintaining an agriculture department and *either* a manual training *or* a home-making department. *No limit was placed upon the number of schools to be so encouraged.* As a result of this legislation there were aided during the school year 1911-12 twenty-eight schools (Putnam, \$2500) and fifty-seven schools (Benson-Lee, \$1000). There were in association with the Putnam schools a total of two hundred fourteen rural schools with an enrolment in manual training subjects of 272 boys.

The next legislature (1913) further⁷ amended the laws of 1909 to offer \$1800 in place of \$1000 to the Benson-Lee schools and to award them as well as the Putnam schools the \$150 annual bonus for each associated school. They made association obligatory upon districts of less than eighteen sections in area up to this named extent⁸ and considered the limitation of aid. The Putnam award was not to exceed two thirds of the sum expended on agricultural and manual training departments and the Benson-Lee award was not to exceed the full expenditure of the departments maintained.

⁵ *General Laws*, 1911 ch. 82, H. F. No. 392, to amend secs. 1, 2, and 3 of ch. 247 *General Laws*, 1909.

⁶ *Ibid.*, 1911 ch. 91, H. F. No. 222.

⁷ *Ibid.*, 1913 ch. 309, to amend sec. 4 of ch. 247 *General Laws*, 1909.

⁸ *Ibid.*, 1913 ch. 96, to amend ch. 91 *General Laws*, 1911.

The rules⁹ of the High School Board were in this year made more specific and an issue distributed so that administrators and teachers might be governed by fairly definite standards in equipment and teacher preparation. In the Putnam schools there were to be three special instructors one for each of the three subjects in consideration, and in the manual training division the addition of ironwork or forging to the original offering of woodwork and mechanical drawing was specified. In the Benson-Lee schools there were to be at least two special instructors, one for agriculture and a second for either manual training or home training, the principal being permitted to qualify for, and to instruct in, one subject. There was to be one shop equipped for woodwork, one drawing room, and one forge room in schools offering this subject. Instructors were required to have "adequate training in a technical school and a special industrial certificate granted by the state" upon (a) graduation from an approved college or normal school or (b) meeting of standards acceptable to the state superintendent of schools.

In 1914 the rules¹⁰ of the board were made more specific regarding the amount of time to be given to the manual training work in the schools applying for aid. In the grades provision was made for eighty minutes each week for a period of two years. Wood turning was suggested to be added in the schools selected for \$2500 subsidy.

The 1915 Legislature departed from consideration of *agriculture, home making, and manual training as a group* and made mention of them in relation to aid as separate offerings, adding to the list a fourth—commercial training. From this point, therefore, it is possible to present the facts about the manual training work alone. The act of this year,¹¹ "*An Act To Define and Provide for Instruction in Industrial Subjects in the Public Schools,*" provided \$600 annually for manual training departments, a \$200 bonus to central schools for each associated rural school, and a \$50 bonus to each associated school, effective for the school year 1915-16.

⁹ Rules of the High School Board relating to high and graded school buildings. State of Minnesota, Department of Education Bulletin 45: pp. 11, 13, 30. May, 1913.

¹⁰ *Ibid.*, pp. 12, 13, 20, 30. May, 1913.

¹¹ *Session Laws*, 1915 ch. 239, H. F. No. 1040, repealing ch. 247 *General Laws* 1909, ch. 82 *General Laws*, 1911, ch. 91 *Laws*, 1911 as amended by ch. 96 *General Laws*, 1913 and ch. 309 *General Laws*, 1913.

TABLE V
STATE AID TO HIGH AND GRADED SCHOOLS FOR PURPOSES OF INDUSTRIAL EDUCATION SINCE ITS BEGINNING

Year Ending June	\$2500 Schools ^a	\$1000 Schools ^b	\$1800 Schools ^b	\$600 Schools ^c	Total Aided ^d	General Aid All Schools ^d	Total Aid Associa- tion ^e	Central Schools	Asso- ciated Schools
1910	10	...	...	...	10	\$119,591	...	...	...
1911	16	...	...	...	16	133,646	\$16,200	22	101
1912	28	57	...	...	85	237,853	18,900	22	214
1913	28	75	...	...	103	256,695	44,542	19	93
1914	40	...	99	...	139	287,020	40,400	44	232
1915	40	...	105	...	145	78,240	39,925	49	269
1916	...	...	...	131	131	105,465	65,450	52	281
1917	...	...	...	178	178	...	75,450	63	237
1918	...	...	...	...	...	...	69,100	59	214
1919	...	...	...	119	119	66,217	53,950	38	237
1920	...	...	...	149	149	84,182	52,650	38	205
1921	...	...	...	162	162	89,608	45,450	29	167
1922	...	...	...	163	163	88,949	35,650	23	

^a Amount to encourage agriculture, home economics, and manual training.

^b Amount to encourage agriculture, and either home economics or manual training.

^c Amount to encourage manual training alone.

^d Total aid to high and graded schools aided and total schools aid.

^e Total to central and to associated schools.

NOTE.—Aid for trade and industrial courses (Smith-Hughes, all-day, evening, and part-time) will be shown in a separate table.

The board rules¹² were little changed, the chief difference being that instructors must be graduates of four-year high schools and must have completed two years of work in an accredited technical or training school. The rules of the following year (1916) called for the offering of the work to both the seventh and the eighth grades (80 minutes a week each) and two years of work in the high school (80 minutes a day). In cases where a third year's work was contemplated, consideration was urged of the work of machine shop practice as a new school subject. The total floor area of manual training departments was to be at least one thousand (1000) square feet.

Considerable growth in the number of aided departments occurred in the years from 1909 to 1917 as is shown by the accompanying table (Table V). No aid was granted for the school year 1917-18 and it has been shown that a considerable dropping off in the number of departments maintained occurred in this year. Restoration of aid was made for the year 1918-19 and 119 schools participated; the number now approaches the pre-war figures.

Closer designation was made in the rules of 1918¹³ of the physical minimum for departments. There were to be at least one thousand square feet of floor space, the ceiling to be not less than twelve feet from the floor, glass area to be one fifth of the floor area, and ventilation to be on a basis of not less than thirty cubic feet per pupil. A bench room and a mechanical drawing room were to be adjoined with a partially glass partition for the more convenient supervision of the work. Graded schools of Class A were to provide a two-room department not less than five hundred sixty square feet of floor space and Class B schools not less than three hundred sixty square feet.

The *Laws of 1919*¹⁴ continued aid to schools operating under Chapter 247, *Laws of 1909* as amended, maintained the standards of the previous year, and¹⁵ accepted for the state the terms of the Federal Act concerning vocational education (Smith-Hughes

¹² Rules of the High School Board. State of Minnesota, *Department of Education Bulletin* 45: 11, 12, 13, 15, 19, 25. May, 1915.

¹³ Rules of the Department of Education relating to school buildings, revising the 1915 edition. *Ibid.*, 56. September, 1918.

¹⁴ *General Laws*, 1919 ch. 239, sec. 1.

¹⁵ *Ibid.*, ch. 414, sec. 1; ch. 491, secs. 1, 2.

Act, approved February 23, 1917). Standards for manual training departments were unchanged in the rules¹⁶ of this year.

In 1921 the \$600 flat aid to schools maintaining industrial departments was continued and¹⁷ in the vocational work change was made to reimburse for teachers salaries from "not to exceed $2/3$ " to "not to exceed three-fourths ($3/4$)" of such salaries.¹⁸ No new associations were to be formed but the aid of \$200 to central schools for each rural school associated and the \$50 award to each associated rural school was to be continued. Standards¹⁹ revised and issued in this year sought to change the name and to clarify the aim of the shop work in the formal courses of the curricula. *General industrial training* was to be attempted rather than vocational training and "in carrying out this aim it is suggested that experience in the elements of several occupations be given in the seventh and eighth grades." It was suggested that the school year might be divided into periods of nine, ten, or twelve weeks with the offering a different one during each period, provided that equipment and instructors were available. There were to be at least eighty minutes of work each week in both the seventh and eighth grades and one year of work, eighty minutes each day, in either the ninth or tenth grades of the high school. This one year's work might be in one subject throughout the year or in two subjects for one-half year each.

The qualifications for instructors were unchanged. To the notes on physical standards were added the suggestions that, if auto mechanics were taught, an outside doorway be made as well as provision for carrying off the exhaust from engines.

A special bulletin²⁰ on vocational education, issued in 1922, outlined plans for Smith-Hughes work to be effective 1923 to 1926 inclusive and covered standards in teacher qualification, equipment, and course content, for the day, evening, and part time classes and schools.

¹⁶ Organization and standards, high and graded schools. State of Minnesota, *Department of Education Bulletin* pp. 16-19, 20-24. August, 1919.

¹⁷ *General Laws*, 1921 ch. 219. sec. B, sub. A.

¹⁸ *Ibid.*, ch. 497, sec. 20, amending ch. 414, sec. 2 *General Laws*, 1919.

¹⁹ Organization and standards, high and graded schools. State of Minnesota, *Department of Education Bulletin* pp. 23-27, 30. August, 1921.

²⁰ Vocational education in Minnesota, 1922. State of Minnesota, *Department of Education Bulletin*. 65 pages.

We are brought now to the present year in which reduction from \$600 to \$500²¹ was made in the aid for general industrial training and in which the provisions for reimbursement for vocational education were continued.

Issue was made also of the first comprehensive syllabus,²² in this special field. This bulletin was prepared by a special committee working under the direction of a state committee organized to report on all high school subjects. Concise statement was made of aims and much detailed material was offered in suggestion of how these aims might best be attained under varying conditions. In so far as uniformity of offering and course content is advisable the bulletin is constructive and should strengthen materially this special branch of instruction.

A new revision of state rules on buildings and sites²³ issued in 1923 makes this significant reference to the course work here under consideration.

The space provided for general industrial training will depend to a great extent upon the type and amount of work to be offered, but in no case shall the floor area be less than eleven hundred and twenty (1120) square feet. The space may be left in one room or may be divided into separate rooms in accordance with local requirements.

The foregoing suggestion is in support of a new type of offering being projected in the smaller schools of the state.

G. SMITH-HUGHES TRADE AND INDUSTRIAL EDUCATION

The Federal Act of February 1917, the Smith-Hughes Act, made possible the conduct of strictly vocational classwork with federal subsidy. No inclusion is here made of activities in the fields of home economics and agriculture nor of teacher-training in any of the vocational lines selected for encouragement by this law. The present study being concerned only with work of an industrial nature for boys and men, we confine our data to the trade and industrial activities and such commercial work as has been conducted and reported under this special classification and accounting.

²¹ *General Laws*, 1923 ch. 331, H. F. No. 362, sec. 1, sub. B, amending ch. 467, sec. 10 *General Laws*, 1921.

²² High school curriculum and syllabi of high school subjects. Bul. No. 9 General Industrial Training. State of Minnesota, *Department of Education*. August, 1923. 50 pages.

²³ State of Minnesota, Department of Education, Laws and rules governing school buildings and sites. Division of Buildings and Sanitation, sec. 29, p. 28. January, 1923.

TABLE VI
NUMBERS OF (SMITH-HUGHES) TRADE AND INDUSTRIAL CLASSES AND TEACHERS
(Minnesota 1918 to 1923, Years Ending June 30)^a

Year ending June 30	Number of Classes					Number of Teachers ^b				
	Evening	All-day	Part-Time		Total Classes	Evening	All-day	Part-Time		Total teachers
			Trade ext.	Gen. cont.				Trade ext.	Gen. cont.	
1918	35	13	2	..	50	184 114-70	54 17-37	8 2-6	.. ..	246 133-113
1919	8	5	5	3	21	51 51-0	35 20-15	9 6-3	8 0-8	103 77-26
1920	14	7	8	10	39	52 52-0	43 27-16	27 21-6	16 12-4	138 112-26
1921	21	6	5	7	39	51 51-0	50 24-26	16 16-0	12 2-10	129 93-36
1922	16	8	2	5	31	64 62-2	61 46-15	11 7-4	7 1-6	143 116-27
1923	17	5	1	10	33	57 48-9	65 34-31	13 7-6	9 3-6	144 92-52

Data from classified tables in the annual reports of the Federal Board for Vocational Education, 1917 to 1923 inclusive.

^b Double entries placed immediately below single entries indicate the sex divisions. Example: Evening class teachers in 1918 numbered 34, of whom 114 were men and 70 were women.

TABLE VII
(SMITH-HUGHES) TRADE AND INDUSTRIAL ENROLMENT
(Minnesota 1918 to 1923, Years Ending June 30)^a

Year Ending June 30	Evening Students			All-Day Students			Part-Time Ext. Students			Gen. Cont. Students			Grand Total
	Men	Women	Total	Men	Women	Total	Men	Women	Total	Men	Women	Total	
1918	93	...	93	224	297	521	...	118	118	...	...	...	732
1919	1063	...	1063	170	396	566	234	72	306	30	65	95	2030
1920	1060	...	1060	232	437	669	209	105	314	191	140	331	2374
1921	967	8	975	220	536	756	283	...	283	124	643	767	2781
1922	901	37	938	583	476	1059	303	86	389	69	203	272	2658
1923	740	138	878	660	602	1262	370	179	549	543	304	847	3536
Totals .....	...	...	5007	...	...	4833	...	...	1959	...	...	2312	14111

^a Data from classified tables in the annual reports of the Federal Board for Vocational Education, 1917 to 1923, inclusive.

Table VI shows the numbers of schools and classes conducted since the beginning of Smith-Hughes work in this state as classified by the Federal Board in their annual reports. The numbers of schools and classes are to be interpreted literally and not as the numbers of cities conducting classes or schools of the type named. The towns availing themselves of Smith-Hughes reimbursement in the field of trade and industrial education have not exceeded eight in number in any single year.

TABLE VIII
SMITH-HUGHES TRADE AND INDUSTRIAL EXPENDITURES
(School year ending June 30, 1923)^a

Other than General Continuation	
Federal funds	\$20,642.88
State funds	18,045.53
Local funds	78,963.82
<hr/>	
Total funds	\$117,652.23
General Continuation	
Federal funds	\$ 6,686.66
State funds	3,343.33
Local funds	3,343.33
<hr/>	
Total funds	\$ 13,373.32
Grand Total	131,025.55

We show below the detail of the use of the federal funds.

Evening classes	\$ 1,789.90
Trade extension classes	5,194.70
General continuation classes	6,686.66
All-day classes	13,658.28
Teacher-training (trade and industrial)	5,796.46
<hr/>	
Total	\$33,126.00

^a Federal Board for Vocational Education. *Seventh Annual Report*, p. 150. 1923.

Evening classes are seen to have been most numerous and the whole range of activities to have been unsteady and doubtful of growth. The agricultural, small city nature of the state precludes the possibility of its ever being one highly significant in definite vocational preparation for industry. We shall hope for increase in the number of students served in all three departments of the work (all-day, evening, and part-time) and special studies to

determine the needs of communities are now in progress by the State Department of Education. Growth will be slow but it will be permanent because based upon decisions carefully made.

We show by Table VII the total group enrolment in these special classes and schools. The numbers included under the heading "Women" should not be thought of as home economics students but as girls and women receiving preparation for, or extended training in, women's industrial occupations. Here again we find the evening enrolment to predominate but the all-day and part-time groups to be much closer in numbers than would have been expected from examination of the previous table alone.

Expenditures for the vocational course work are given for the one year (1922-23) to show that, to date, these activities have attained no mean proportions and that we have a basis for study and comparison and a body of work already done that should be examined for all possible guidance facts and experiences.

TABLE IX
SMITH-HUGHES TRADE AND INDUSTRIAL CLASSES
Individual subjects and numbers enrolled in each
(School year ending June 30, 1923)

Subjects	Students	Subjects	Students
Applied mathematics	23	Nursing:	
Auto electricity	27	Chemistry for nurses	47
Auto mechanics	168	Dietetics for nurses ..	21
Banking	252	Massage for nurses ..	40
Blue print-reading	37	Practical nursing	134
Builders' hardware	35	Pattern-making	11
Business management ..	267	Plumbing	35
Cabinet-making	37	Printing	11
Carpentry and building		Retail selling	322
construction	37	Salesmanship	13
Comptometry	400	Sheet metal	20
Commercial cooking	61	Show card-writing	35
Drafting or drawing:		Slide rule operation	10
Architectural	37	Steam engineering	28
Mechanical	35	Steel plant courses:	
Related	143	Electricity	29
Electricity	142	Drafting	34
Janitor engineering	410	Steel square-reading ...	13
Machine shop	221	Telegraphy	83
Metallurgy	17	Trade dressmaking and	
Millinery	168	millinery	319
Monumental design	142	Welding	30
		Woodworking	27

The cities conducting vocational industrial courses in 1922-23 were Duluth, Mankato, Minneapolis, St. Cloud, St. Paul, South St. Paul, and Virginia. There were offered 39 separate subjects, 27 of which may be said to be of strictly industrial character. The subjects with the respective numbers of students are as indicated in Table IX.

H. SUMMARY AND CONCLUSIONS

(Numbered consecutively throughout the study)

1. Only four Minnesota high schools offered shop and drawing courses in the school year ending in June, 1894. The number increased slowly to fourteen schools in the next ten years, rose rapidly to nearly two hundred in the second decade, and now wavers near the one hundred ninety mark. (Some of these departments are not state aided.)

2. Bench woodwork, mechanical drawing, and to a much less extent "ironwork," have been the standard offering through the years. Art metal work, bookbinding, plumbing, and welding have been experimented with at various periods in a few schools but have not held place as scheduled subjects. Machine shop practice, sheet metal work, electricity, automobile mechanics, and printing seem to be establishing themselves. Carpentry and wood-turning waver between acceptance either as special units or as phases or extensions of the bench woodwork and cabinet-making courses.

3. The cost, both initial and operation, is the chief factor in determination of variety of offering. One of the aims of the present study is to reveal that a good industrial program is worth all that it costs and that greater-than-present returns can be had with little additional expense.

4. Special classes for girls have been discontinued altho a few girls elect the courses. There has been a decrease in the number of formal classes below the seventh grade, due largely to the standards set for procurement of aid. The peak of the load is now in grades seven through ten, with increasing offering and acceptance above ten.

5. Industrial teacher's salaries always increasing slightly, were accelerated by war conditions, and the gains have been permanent with the tendency now gradually upward.

6. The median salary for all instructors outside our three largest cities, teaching and supervision men, is near \$1850. Within these three cities the median for high school teachers is \$2250, supervisors' salaries not included. Compared with teachers of academic subjects, in the same school systems and at the same level in the organization, the industrial teachers are better paid while they possess an inferior special training. Their training is also made the subject of special study.

7. State aid has been given for the encouragement of industrial courses since 1909 with the exception of one school year (1917-18). The grants, tho small, are determinants as shown by the dropping of departments in,

and following, the one no-aid year. The reversal was perhaps not so much occasioned by the loss of the award, then \$600, as by the feeling that those in state administrative authority and representative privilege had lost faith in the merits of the special subjects.

8. Aid has passed through several periods. In 1909 ten selected schools received \$2500 each for encouragement of industrial, agricultural, and home-making course work. In 1911 the amount was set at \$1000 and the number of schools was unlimited. A \$150 bonus was offered to central schools for each rural school taken into association. The year 1913 saw the \$1000 raised to \$1800 with the same unlimited privilege extended. In 1915 each of the three named departments was recognized individually and the aid for industrial work was set at \$600. The bonus to central schools for each rural school was raised to \$200 and a \$50 special inducement was given directly to each associated rural school. In 1921 general aid was reduced to \$500, the present figure, with 162 towns participating in the past year.

9. Rules and standards conditioning aid have been printed from time to time and have allowed much latitude while marking out trends. These rules seek chiefly to control space and equipment, teacher preparation, intensity of offering, and quality of work. It is now required that the course be given in grades seven and eight for at least eighty minutes each week and in the first year of the high school for eighty minutes daily. This minimum is greatly exceeded by most of the schools maintaining departments.

10. In 1921 suggestion was made by the State Department of Education that the term *manual training* be displaced by the term *general industrial training*. The distinction between the two was clearly made at that time and was emphasized by a special syllabus in August, 1923.

11. Provisions of the Smith-Hughes law were accepted for the state in 1919 but there has been no appreciable growth in the number of towns doing strictly vocational industrial work. Not more than eight towns, in any single year, have availed themselves of the new aid plan for the industrial branches, Minneapolis, St. Paul, and Duluth being counted. Evening classes are most numerous, there being seventeen classes and schools with fifty-seven teachers in 1922-23. The agricultural, small-city nature of the state precludes the possibility of its ever being one highly significant in definite vocational preparation for industry. Studies of the need for vocational courses are now being conducted by the State Department in towns above ten thousand population, so that what is attempted may be permanent because based on decisions carefully made.

The total Smith-Hughes expenditure (federal, state, and local) for 1922-23, exclusive of teacher training, was in excess of \$130,000. We have therefore a body of work already done that is not inconsiderable, and which should be examined for all possible guidance facts and experiences.

CHAPTER II

A GENERAL SURVEY OF THE WORK IN SIXTY-FIVE REPRESENTATIVE SYSTEMS (1922-1923)

A. THE SELECTION OF PLACES TO BE VISITED

Chapter I traced the history of the special industrial subjects through thirty years and brought us to a general appreciation of the present status of the work in the state as a whole. *We proceed to a detailed analysis by reliance upon facts and impressions gathered first-hand in sixty-five of the towns offering the work.* We now desire to show that these departments and towns were not selected at random but with design to have them truly representative of the state condition. They constitute one third of the whole number of Minnesota towns maintaining in their school programs, industrial courses for boys.

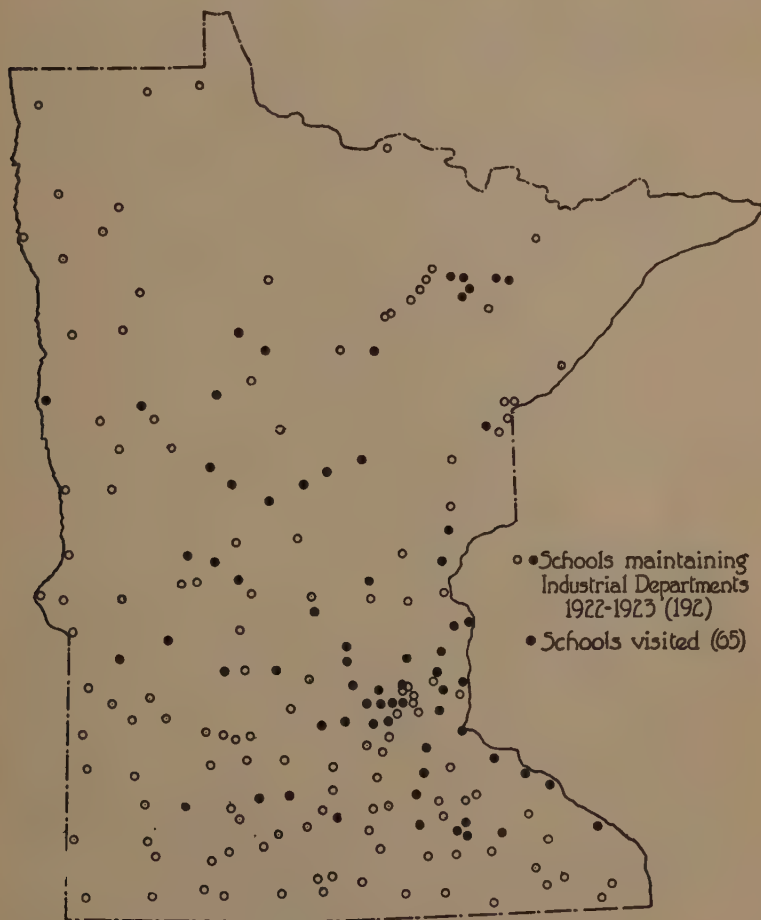
They were chosen through consideration of five distinguishing factors likely to modify or determine practice in industrial work, namely: (1) scatter in the state, (2) size of town and school, (3) type of community, (4) type of school organization, and (5) type of industrial department. The three largest cities, Minneapolis, St. Paul, and Duluth were not included because their problems are not typical of the state as a whole and because they employ special supervisors for the leadership and guidance of their special faculties.

1. *Scatter in the state.*—Reference to the spot map, Figure 5, will show that the schools chosen are distributed closely in accord with the location of the total number of schools in the state which have industrial departments. Every part of the state was sampled as thoroly as could be justified when time and money cost were considered. That some counties or sections of the state were not visited is offset by the fact that departments are few or do not exist in these counties or sections.

2. *Size of town and school.*—The representativeness in size is best expressed by the number of places visited as compared with the number of places possible of visit, i.e., maintaining industrial departments, within definite size groups. Attempt was made fairly

FIGURE 5

THE SCATTER OF THE SIXTY-FIVE TOWNS SELECTED FOR VISITATION



to sample all sizes of cities and especial importance was given to the very large and to the smallest places, because these offer greatest difficulty.

It is true of Minnesota that the size of a town is not constantly an index of the size of the high school population, as will be brought out by the following facts. Six towns having the same population, approximately 1500 people, maintained high schools enrolling 136, 149, 174, 208, 230, and 249 pupils, respectively. The thirty-three towns below 1000 population range in size of high school from 51 to 160 pupils, and the six towns above 10,000 population, from 504 to 945, these being more in accordance with percentage expectation.

Calls were made at:

3/4	of the towns above 10,000
1/2	between 9,000 and 10,000
1/2	between 8,000 and 9,000
4/5	between 7,000 and 8,000
2/3	between 6,000 and 7,000
3/4	between 5,000 and 6,000
3/8	between 4,000 and 5,000
5/11	between 3,000 and 4,000
7/11	between 2,000 and 3,000
33	of the very great number of towns below 2,000

These figures are presented in the hope that the reader will have in mind a clear conception of the Minnesota situation, while discussion is made of the problems that we face and the means we would employ to lessen administrative and classroom difficulty.

3. *Type of community*.—Classification as to community type is most difficult in that there is considerable overlapping. A three-fold grouping has seemed best.

A few cities and towns may be said to be built around *special industries* such as granite-quarrying and cutting, meat-packing, lumber-milling, railroad shop work, and mining. The number is placed at twelve towns wherein it may be said that the large majority of those who work for wages are employed in the same or closely related occupations.

Seventeen towns may be said to abound with *small manufacturing* establishments and to present to those desiring to enter industrial employment a variety of rather specialized types of work. Numerous among these are the making of furniture, sashes and doors, and barrels, stone, tile, and pottery work, flour milling, foundry, and iron-working, with special application to gas motors, sprayers, and machinery parts. Work on brick, shoes, jewelry, and paper shows the diversity of interest in mechanical output.

The remaining thirty-six towns may be said to be *rural and residential*, with the quickening influence in many cases of small but highly specialized lines such as orcharding, beekeeping, canning, and summer resort work. *More than fifty per cent of the towns of this state maintaining industrial work for boys are of this rural and non-manufacturing type.*

4. *Type of school organization.*—It was deemed necessary to examine the work both in schools of the older eight grades and four-year high school organization and the newer junior-senior type. Of the sixty-five towns visited several gave opportunity to see the influence of the junior high school unit altho the distinction was not so clearly marked as was anticipated.

5. *Type of industrial departments.*—The wish to see departments of all kinds led to the selection of schools employing one, two, and several industrial teachers; those maintaining composite (general) and individual shops; those offering a narrow, and those offering a broad, range of experiences; and those doing special types of work such as home mechanics, farm shop work, and special work for subnormal children.

B. THE TOWNS AND CITIES VISITED (65)

Aitkin	Gilbert	Osakis
Alexandria	Glencoe	Owatonna
Anoka	Grand Rapids	Park Rapids
Appleton	Hastings	Pine City
Aurora	Hopkins	Red Wing
Bemidji	Kasson	Rochester
Benson	Lake City	Sauk Center
Biwabik	Lamberton	Shakopee
Brainerd	Lindstrom-Center City	St. Cloud
Buffalo	Litchfield	St. Louis Park
Cass Lake	Mankato	Sleepy Eye
Chaska	Mantorville	South St. Paul
Cloquet	Milaca	Staples
Crosby-Ironton	Monticello	Stillwater
Delano	Moorhead	Taylors Falls
Detroit	Mound	Virginia
Dodge Center	Mountain Iron	Wabasha
Eveleth	New Ulm	Wadena
Excelsior	Northfield	Wayzata
Faribault	North St. Paul	White Bear
Farmington	Norwood-Young	Willmar
Forest Lake	America	Winona

Altho it is certain that many interesting and worth-while experiments have been omitted from this report because all schools and men could not be visited, it is fair to say that no type of department, of school organization, or of community exists in the state which is not represented in the data collected.

C. CLASSIFICATION OF THE PERSONS CONSULTED

Superintendents and principals	123
Industrial teachers and supervisors, men	110
Heads of normal training departments	30
Teachers of agriculture	13
Teachers of subnormal children	24
Teachers and supervisors of art	13
Librarians and teacher librarians	36

Personal interviews 349

D. THE OFFERING AND ITS ADMINISTRATION

1. *The subjects offered.*—Following is the frequency of offering of the various subjects listed, by towns, with sixty-five the base number. To say that twelve towns offered specially scheduled units of *forging* etc. is not entirely accurate but it is substantially so. Interest centers in the variety and kinds of experiences offered to boys rather than in the courses named as subject to credit assignments. If, in a given school, a boy might gain the experience of working in wood at a lathe or of forming heated metals at a forge, the subject was scored; tho it did not constitute a unit or half unit open to separate election and to entry upon the cumulative record. Division is made in the list so that one notes quickly the ten subjects of highest frequency.

Subject	No. of Towns	Subject	No. of Towns
Bench woodwork	65	Millwork	6
Mechanical drawing	64	Home mechanics	4
Architectural drawing ...	16	Arts and crafts	3
Wood-turning	13	Foundry practice	3
Forging	12	Cement work	2
Carpentry	11	Furniture weaving	2
Auto mechanics	11	Photography	1
Electric wiring	10	Subnormal classes	21
Printing	10	Normal training classes ..	37
Machine shop practice ...	10	Theory of vocations	1
Sheet metal work	9	Farm shop work	15
Pattern-making	6	Related subjects	8
Machine design	6	Base for this table	65

The most common offering is still woodwork and mechanical drawing but there is a definite trend toward the broadening of experience. Some forward looking programs are here listed in the hope that they may show the possibilities in systems of various sizes as well as the freedom to experiment which is possible in our state. The administrators in the places named will welcome opportunities to pass on to others their plans, failures, and successes.

2. *Ten selected plans.*—Details are given of the offering and conditions of work for towns ranging in population from four hundred to twenty thousand.

Mound—393 population—145 high school enrolment—1 instructor

Seventh grade—80-minute periods, 2 days a week for 12 weeks each: basketry and fiber-cord weaving, elementary mechanical drawing, elementary woodwork.

Eighth grade—80-minute periods, 2 days a week for 12 weeks each: household mechanics, elementary electricity, intermediate woodwork.

Ninth grade—80-minute periods, 5 days a week for 18 weeks each: mechanical drawing, cabinet-making.

Tenth grade (plus)—80-minute periods, 5 days a week for 18 weeks each: practical carpentry, care and repair of the automobile.

Aurora—2809 population—146 high school enrolment—2 instructors

Seventh grade—80-minute periods, 5 days a week for 12 weeks each: woodwork, printing, sheetmetal.

Eighth grade—80-minute periods, 5 days a week for 12 weeks each: drawing, cabinet-making, combination of machine shop practice and automobile repair.

Ninth grade (plus)—80-minute periods, 5 days a week for 36 weeks: elective from woodwork, cabinet-making, forging, drawing, printing, sheetmetal, machine shop practice, automobile mechanics, farm shopwork.

Detroit—3426 population—413 high school enrolment—1 instructor

Seventh grade—80-minute periods, 1 day a week, for 36 weeks: woodwork and incidental drawing.

Eighth grade—80-minute periods, 1 day a week for 18 weeks each: woodwork, elementary electric wiring, both with incidental drawing.

Ninth grade—80-minute periods, 5 days a week for 18 weeks each: carpentry, sheetmetal, both with incidental drawing.

Tenth grade (plus)—80-minute periods, 5 days a week for 36 weeks: elective from all subjects previously named. Composite shop plan with three rooms used in part.

South St. Paul—6860 population—311 high school enrolment—3 instructors

Seventh grade B—80-minute periods, 5 days a week for 19 weeks: elementary woodwork.

Seventh grade A—80-minute periods, 5 days a week for 6 weeks each: electricity, sheetmetal, home mechanics.

Eighth grade B—80-minute periods, 5 days a week for 19 weeks: cold ironwork.

Eighth grade A—80-minute periods, 5 days a week for 19 weeks: elective from all subjects previously named.

Ninth grade—80-minute periods, 5 days a week for 19 weeks each: woodwork, mechanical drawing.

Tenth grade—80-minute periods, 5 days a week for 19 weeks each: cabinet-making, architectural drawing.

Ninth to twelfth grades—Printing is elective, two years of work offered.

A special Smith-Hughes course in building construction and related subjects. Two and one-half clock hours, 5 days a week for 38 weeks.

Eveleth—7205 population—662 high school enrolment—7 instructors

Seventh grade—80-minute periods, 5 days a week for 18 weeks each: woodwork, forging.

Eleventh grade—80-minute periods, 5 days a week for 18 weeks each: sheetmetal, printing.

Ninth to twelfth grades—80 minute periods, 5 days a week for 36 weeks: elective from the following with certain indicated restrictions: woodwork (9), forging (9), mechanical drawing (9 and 10), printing, pattern-making, machine shop practice, architectural drawing (11 and 12) cabinet-making (12), automobile mechanics (11 and 12).

Red Wing—8637 population—475 high school enrolment—3 instructors

Seventh grade—80-minute periods, 4 days a week for 36 weeks: woodwork and incidental drawing.

Eighth grade—80-minute periods, 4 days a week for 36 weeks: woodwork and incidental drawing.

Ninth grade—80-minute periods, 5 days a week for 18 weeks each: cabinet-making, mechanical drawing.

Tenth grade—80-minute periods, 5 days a week for 18 weeks each: pattern-making and turning, carpentry and related drawing.

Eleventh grade—80-minute periods, 5 days a week for 18 weeks each: forging and foundry practice, mechanical drawing.

Twelfth grade—80-minute periods, 5 days a week for 18 weeks each: machine shop work, mechanical and architectural drawing.

Faribault—11,089 population—504 high school enrolment—3 instructors

Seventh grade—60-minute periods, 5 days a week for 18 weeks each: woodwork, elementary electricity.

Eighth grade—60-minute periods, 5 days a week for 6 weeks each: theory of vocations, vocational sketching, agriculture, bookkeeping, typewriting, woodwork.

Ninth and tenth grades—60-minute periods, 5 days a week for 36 weeks: elective from woodwork, mechanical drawing, automobile mechanics.

Eleventh and twelfth grades—60-minute periods, 5 days a week for 36 weeks: elective from machine shop practice, automobile mechanics, advanced drawing, either mechanical or architectural.

Rochester—13,722 population—573 high school enrolment—4 instructors

Seventh grade—60-minute periods, 5 days a week for 36 weeks: wood-work.

Eighth grade—60-minute periods, 5 days a week for 18 weeks each: wood-turning, mechanical drawing (or 36 weeks of forging).

Ninth grade—60-minute periods, 5 days a week for 36 weeks: machine woodwork or machine shop practice.

Tenth grade—60-minute periods, 5 days a week for 36 weeks: pattern-making or automobile mechanics.

Ninth to twelfth grades—elective, full year of advanced mechanical drawing.

Tenth to twelfth grades—elective, full year of architectural drawing.

Virginia—14,022 population—945 high school enrolment—10 instructors

Seventh grade—60-minute periods, 5 days a week for 10 weeks each: home mechanics, wood-turning, agriculture, mechanical drawing.

Eighth grade—60-minute periods, 5 days a week for 10 weeks each: business methods, electricity, metal work, printing.

Ninth to twelfth grades—60-minute periods, 5 days a week for 36 weeks: one subject dealing with wage-earning required of all students, elective from the following list: art, agriculture, electricity, wood-turning, industrial economics, printing, related science, related mathematics, forging, pattern-making, mechanical drawing, architectural drawing, machine shop practice, automobile mechanics, cabinet-making, photography.

Trade courses in all shop and drawing subjects previously named are offered continuously. A student may spend two and one-half hours a day in a course of his selection for any desired length of time.

St. Cloud—19,000 population—700 high school enrolment—5 instructors

Seventh grade—80-minute periods 5 days a week: drawing for 12 weeks and woodwork for 24 weeks.

Eighth grade—80-minute periods, 5 days a week: drawing for 12 weeks and woodwork for 24 weeks.

Ninth grade, general shop course—80-minute periods, 5 days a week for six weeks each: six exploratory courses for boys who enter from rural and parochial schools without previous contact with industrial subjects (machine shop practice, printing, electricity, gas engines, woodwork, mechanical drawing).

Ninth grade (regular)—80-minute periods, 5 days a week, for 18 weeks each: elective from all subjects listed previously.

Tenth to twelfth grades—80-minute periods, 5 days a week for 18 or for 36 weeks. Elective from woodwork, cabinet-making, mechanical drawing, architectural drawing, machine drafting, gas engines, electricity, printing, machine shop practice, forging.

A farm shopwork course for agricultural students.

A lecture course in related industrial art, with sex and industrial course grouping, is^a required.

Well-designed plan for giving occupational information and guidance to all students.

These sample schemes, altho they comprehend varying kinds and amounts of equipment and varying numbers of instructors, show a sameness in the types of work offered. The requirement, however, is not uniform, the sequence of subjects is dissimilar, and the time allotments are of considerable range. The details bring out just what we should wish to know—that every administrator in Minnesota has the privilege to attempt what he feels will help to realize worth-while aims and what will prove practicable under his special condition. Notwithstanding this desired latitude the writer feels that some standardization is essential, especially as regards the sequence of subjects, lengths of courses, and hours per year. Suggestions will be made later but there are yet no experimental data which justify any given procedure.

TABLE X

AMOUNTS OF INDUSTRIAL CREDIT AVAILABLE; NUMBERS AND PERCENTS OF 161 SCHOOLS OFFERING EACH AMOUNT

Industrial Credits Available	Schools Offering Each	Per Cent of 161
$\frac{1}{2}$	4	2.5
1	18	11.1
$1\frac{1}{2}$	4	2.5
2	73	45.4
$2\frac{1}{2}$	14	8.7
3	20	12.4
$3\frac{1}{2}$	4	2.5
4	17	10.5
5+	7	4.3

3. *The industrial credits open to election.*—Tabulation of 161 usable reports of industrial departments (unpublished) in the files of the State Department of Education revealed the facts of credit amount shown in Table X. The three largest cities have been omitted.

The most common figure is two credits of the sixteen required for graduation, with considerable numbers of schools at one, three, and four credits, respectively. The larger places, having broader and more intensive offerings, account for most of the lower one half of the table. Superintendents and principals, when asked regarding their desires in the matter of extension of the credits in this work, were found to be in rather close agreement. Given the facilities, they would generally increase the offering to four credits of the sixteen. Some already have set up plans whereby certain selected students may submit industrial credits in excess of the amount usually set as a maximum by higher institutions. There is, however, an all too prevalent intention or seeming compulsion to regard the high school as a preparation ground for any or certain ones of the colleges and universities. Facts to be shown later on the whereabouts of graduates of these high schools would lead us to conclude that vocational courses of some type may well be pursued by most of our students during one half of their high school lives.

We assume that one large function of the industrial work for boys is to acquaint them with the conditions of employment and the social problems of our largest groups of workers. It was felt necessary therefore to determine to what extent there are offered in the schools subjects separated from, but supporting, the industrial courses in this named function.

Economics	154	Farm mechanics	32
Commercial arithmetic	128	Business English	29
Commercial geography	104	Office practice	20
Commercial law	79	Free-hand drawing	17
Community or vocational civics	76	Salesmanship	9
Social problems or problems of democracy	72	Industrial history	3
Sociology	44	Related mathematics and science	3
Base number, 240 schools, exclusive of Minneapolis, St. Paul, and Duluth.			

Consideration is urged here of the facts that many young people drop from the high school rolls before they have access to many of these special subjects; and that the schools making special book course offerings are in great part the same schools that maintain strong industrial departments. Our concern is that in the smaller places the need for both shall be seen and an

attempt made to meet it; and that in the larger systems the one may not be thought to be in conflict with or unnecessary because of the other.

4. *The time element.*—The number of weeks of school per year varies in the sixty-five towns as follows: 36 weeks, 52; 38 weeks, 8; 39 weeks, 2; and 40 weeks, 3 towns. For the compilation of hours per year of industrial work we may take the 36-week year to be standard.

The number of periods per week and the length of the periods for scheduled industrial classes is extremely varied also and is shown in detail in the following double table.

TABLE XI
NUMBERS AND LENGTHS OF SINGLE PERIODS GIVEN TO INDUSTRIAL SUBJECTS
IN GRADES AND HIGH SCHOOL

Periods Each Week	Number of Towns			Length of a Single Period in Minutes	No. of Towns
	Seventh Grade	Eighth Grade	High School		
2 single	14	9	..	35	I
3 single	..	3	..	40	39
4 single	I	2	..	45	II
5 single	7	8	7	50	6
1 double	29	26	..	60	5
2 double	12	13	..	65	3
3 double	I	3	..	..	..
4 double	I	I	..	..	..
5 double	..	..	58	..	..

The most common practice is to offer the seventh and the eighth grade work for one double period of eighty minutes each week and the high school work for five double periods of eighty minutes each. Assuming the year to be thirty-six weeks we find the most frequent plans to permit 2880 minutes, or 48 clock hours, for grades seven and eight, and 14,400 minutes, or 240 clock hours, per year for high school classes. Where the work is offered below the seventh grade 80 minutes per week is most common.

No doubt the effect of the work on boys and the efficient use of the instructor's time are modified quite as much by the length and frequency of class periods as by the total hours scheduled

per year. It would seem ill-advised to meet groups for less than one clock hour in any shop subject, even tho these meetings come with frequency. The time necessary to get under way and again necessary to put the work and equipment in readiness for dismissal is no inconsiderable part of a single period. With the tendency toward larger classes the problems of instruction should not be increased by the curtailment of time in class sessions.

Two plans are suggested to reduce instructional and managerial difficulties. (1) Where but eighty minutes each week are now offered to a grade or division of a grade it may be helpful to schedule one group for intensive work throughout a semester and to let another group await their turn. This would reduce the number of individuals in the care of an instructor during any semester or term and lead to less of weekly adjustment and hence to more accomplishment on the part of the students. (The parallel classes for girls in home economics would doubtless permit of the same treatment.) (2) Where more than one and less than five double periods are scheduled for the grades it seems appropriate to suggest the following weekly plan:

Monday	Tuesday	Wednesday	Thursday	Friday
8th grade	7th grade	8th grade	7th grade	8th grade

With this plan the eighth grade would receive more time than the seventh, which is in accord with the policy of still more time for the high school classes. Alternation of classes as a continuous process, often interrupted by holidays and other special changes, has brought confusion. The plan here suggested permits the clear statement that a given group meet on a certain day if they meet at all.

5. *The sizes of classes and the overlapping of grades.*—The following table presents the facts of class size for sixty-four of the towns visited. It will be noted that the average is about sixteen pupils per class although there is a considerable range. The extreme right-hand column shows the per cents of the class groups not wholly confined to pupils of the same grade but containing a few of other, usually higher, classification

TABLE XII
THE SIZES OF CLASSES AND THE OVERLAPPING OF GRADES IN THE CLASSES

Grade	No. of Groups	Numbers of Students			Per Cent Mixed ^a
		Highest	Lowest	Average	
5	6	19	7	17	0
6	9	22	9	17	0
7	116	24	3	16	3
8	104	28	4	16	8
9	115	27	5	14	25
10	78	23	5	13	46
11	23	24	6	14	61
12	7	18	6	11	43

^a Per cent of the classes of each grade containing students not so classified. (25 per cent of freshman industrial groups contain a few students from other high school years.)

The mixed grouping, often unavoidable by reason of program difficulties, has a bad effect upon class presentation as well as upon individual instruction and should be minimized. Our table reveals that this overlapping is so general as to constitute a subject for definite attention. The difficulty is particularly great in those schools where the extra-grade few are scheduled for a type of work other than the type being given the attention of the majority. Where the extra-grade few are of the subnormal classification and need personal attention the confusion is greatest.

Even in the larger schools where several men are employed to present the materials of several distinct lines of work we seem not to have sensed the difficulties of irregular grouping.

Most of the teachers meet classes of boys ranging in school classification through five grades and are also responsible for special groups, where the special activities are included in the program. The assumption is that the man knows his subject and that he serves his classes equally well as long as they come to him in fairly close grouping as to knowledge or skill in the subject. He stands in the same relation to students as the teacher of mathematics under the departmental system; he teaches electricity or printing to all scheduled for it. But we rarely ask an academic specialist to instruct over a five-grade or a six-grade range and the suggestion is now made that we do less and less

of this in our industrial departments. It would seem hopeless to try to prepare teachers to use methods appropriate to so varying a student personnel. To continue the practice or to extend it would defeat the wish of many teachers to know and to instruct a particular age or type of pupils. Many wish to change the emphasis from subject-matter to student growth in ideals, activities, and skills. Should we not use one teacher to deal with the grades and with special classes through the use of the more elementary and general phases of subjects and another teacher to instruct more mature students in advanced processes and with different aims?

E. THE NUMBER AND TYPES OF STUDENTS ELECTING INDUSTRIAL COURSES

Facts of total enrolment by sexes and by school years are presented in the following table. The figures are for fifty-eight of the sixty-five towns visited. The seven towns omitted because data were not available are sufficiently varied in size so that we may assume the conditions shown to obtain in the sixty-five places and therefore in the state as a whole.

TABLE XIII
THE SEX DIVISION IN HIGH SCHOOL ENROLMENT BY TOTALS AND BY CLASS GROUPS (58 TOWNS IN 1922-1923)

Class	Girls	Boys	Total	Per Cent Boys	Number of the 58 Schools Having		
					More girls	More boys	Equality
I	2,799	2,327	5,126	45	45	11	2
II	2,291	1,452	3,743	39	49	8	1
III	1,911	1,288	3,199	40	52	6	0
IV	1,652	1,046	2,698	39	48	7	3
Total	8,653	6,113	14,766	41			

It will be noted that the number of girls exceeds the number of boys in each of the four high school years and that the ratio is approximately 60-40, the freshman year being farther from this ratio than any other. Had the per cents of boys shown a considerable and steady decline through the four years we might have assumed that the problem of industrial equipment and

course provision lessens with the years. Our conclusion must be rather that boys now constitute forty per cent of our enrolment through the four years and that their needs must be under consideration during all discussions of curriculum and building plans.

Knowing that forty per cent of our enrolment is boys, fairly constant through the four years, our next requirement is to know the part of this forty per cent who are presenting themselves for instruction in industrial subjects. We give in our next table the figures on the fifty-eight towns for the school year 1922-23. *Industrial courses* is assumed here to mean shop and drawing courses exclusive of normal training classes, subnormal groups, the shop work related to agriculture, Smith-Hughes industrial work, and evening classes.

All boys of the seventh and eighth grades are regularly scheduled for these courses in most towns of the state but in the high schools no definite requirement is made. In many places the work has made a steady appeal so that there exists now a virtual precedent that all freshman boys include it in their programs. In a few places there is advice amounting to compulsion, at least in the freshman year, especially in the smaller schools where few first year subjects are provided.

More than sixty-five per cent of the freshman and more than fifty per cent of the second year boys are now pursuing shop and drawing work. The abrupt falling off in the two upper years is explained largely by the fact that two years of work is the amount commonly offered. The per cents in the third and fourth years are sufficiently high, however, to keep the total average well up to the fifty per cent mark. The right half of Table XIV affords a little closer study of the acceptance. It will be brought out later in another connection how many of the recent male graduates of our sixty-five schools earned industrial grades.

Figure 6 places clearly before us the data presented in Tables XIII and XIV. The ratio of girls to boys in the enrolments of the four high school years and in the sixty-five schools as wholes is shown in per cents. We show also the ratio of boys enrolled to boys electing industrial course work, in per cents as before. For determination of the lengths of bars under School Year I

refer to Table XIII to find girl enrolment and boy enrolment 55 and 45 per cent respectively of the total. Reference, next, to Table XIV adds the fact that 67 per cent of the boys in this school year elect industrial work. We then have 67 per cent of the 45 per cent, or 30 per cent, as the length of the third bar.

TABLE XIV

THE RATIO OF BOYS ENROLLED BY HIGH SCHOOL YEARS TO BOYS ELECTING INDUSTRIAL COURSES

The Facts of Enrolment by High School Classes				Numbers of Schools Where Courses Are Elected by			
Class	Boys	Electing Ind. Work	Per Cent	All	One half or more	Less than one half	None
I	2,327	1,552	67	12	37	9	0
II	1,452	775	53	6	21	28	3
III	1,288	328	25	2	9	28	19
IV	1,046	216	21	2	5	24	27
Total	6,113	2,871 ^a	47	Base: 58 schools			

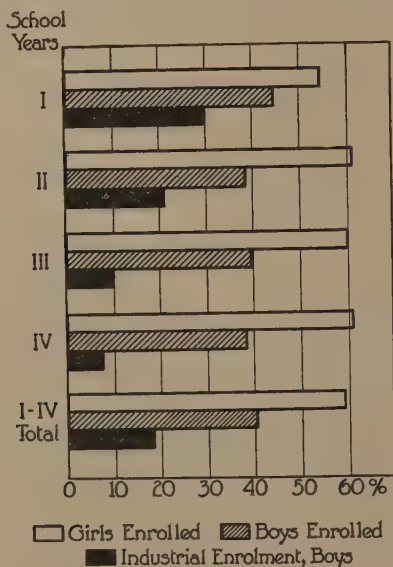
^a The number 2,871 should not be taken as the total boys served in the industrial departments of the cities concerned. The total enrolment for grades, high school, and all types of special classes in these schools would probably be more than double this number. If we add to this figure the number receiving instruction in high schools not aided and in high school departments of the state graded schools our grand total would be greatly extended. (In the year 1921-22 high school departments in graded schools alone enrolled 2,994 boys, of whom 762 were provided with instruction in shop work and drawing.)

Graphic portrayal merely emphasizes the facts that boys "hold their own" through the four years and that industrial enrolment "falls off" directly as the provision for this enrolment is lessened.

Gratifying as are these items of enrolment and election, record must be made of the disconcerting fact that in this year we find many towns maintaining high schools but having no industrial equipment or course work for either grades or high school. These towns are not all at the low end of the enrolment distribution, for forty-five of them have a high school student body of one hundred or more and in population they cover the range up to 3000 people (1920 census). For true equality of opportunity all boys of the state should be privileged to make contact with these course materials so vital for guidance and for the

development of industrial and social intelligence. Surely no town of one thousand or more population should be content to deny the privilege, with cost the only barrier.

FIGURE 6
PERCENTAGE COMPARISON OF GIRLS ENROLLED, BOYS ENROLLED, AND
BOYS ELECTING INDUSTRIAL WORK. SIXTY-FIVE MIN-
NESOTA HIGH SCHOOLS IN 1922-23*



* All schools included maintain industrial departments. Our figure does not, therefore, convey the actual full-state condition but the condition in schools maintaining departments.

As to the type of boys who comprise our industrial groups we have the opinions of the superintendents in all of the towns visited. Sixty-four considered these boys to be no different from other boys of the school in the matter of conduct and general purposeful demeanor. One felt that these classes attracted the lower class or rougher element of his school. Sixty superintendents saw no outstanding difference in the homes represented and fifty-five saw no marked division as to participation in extra-curricular activities and general social adaptation either within the school or out.

No actual check was made on the occupations of the parents altho this fact was found to be a matter of record much more frequently than was anticipated. This point should not be passed without suggestion of the very great usefulness, increasing with the years, of all possible facts on the school life and the whole life of the child. As cases in point, but five of the schools had record of the occupational choices or leanings of their students, and, altho considerable mental testing had been done, there was available very little information because the data had not been made a part of the case histories of the students.

F. THE INCREASING NEED FOR INDUSTRIAL COURSE PROVISION

1. *The growth of the high school population and of the number graduated.*—To argue an increasing need of provision for broader as well as more intensive industrial course work it would seem sufficient to prove the following three assertions: *first*, that while the total high school enrolment grows steadily there is also a marked increase in the per cent of those enrolled who complete the four-year program; *second*, that there is an increasing

TABLE XV

THE GROWTH OF THE HIGH SCHOOL POPULATION AND OF THE NUMBER COMPLETING THE FOUR-YEAR PROGRAM
(Minnesota state high schools, 1895-1922)^a

Year Ending June	Students Enrolled	Number Graduated	Per Cent Graduated
1895	9,402	953	10.1
1900	12,802	1,564	12.2
1905	20,215	2,668	13.2
1910	28,562	3,907	13.6
1915	39,520	5,974	15.1
1916	42,273	6,715	15.8
1917	45,928	7,153	15.6
1918	44,491	6,958	15.6
1919	45,457	6,946	15.3
1920	49,060	7,543	15.4
1921	52,788	8,314	15.7
1922	60,327	9,179	15.2

^a Data from *High School Inspectors' Report* for these years.

number of boys who complete the high school course and that, therefore, provision must be made to offer the work in the later years of attendance; and *third*, that boys recently graduated are now employed in types of work for which industrial course experience and training are greatly worth while or absolutely necessary. Data in support of these assertions are presented in the following tables.

The increase in the number of state high schools from which these data are drawn may be seen by reference to Table I. These figures show that the per cent of the student body that completed the four-year graduation requirement has increased slightly faster than the enrolment itself. This means that we have a constantly greater number of students to provide for in all subjects, including the industrial, throughout the four-year period.

TABLE XVI

COMPARISON OF THE NUMBER OF HIGH SCHOOL GRADUATES IN SIXTY-FIVE TOWNS FOR THE SCHOOL YEARS 1917 AND 1922. PER CENT OF GAIN IN GIRL, BOY, AND TOTAL GRADUATES

Groups by Population	Year Ending June	Schools Providing Usable Data	Number Graduated			Gain Per Cent 1922 over 1917		
			Boys	Girls	Total	Boys	Girls	Total
Below 5,000 Towns 49	1917	31	271	415	686			
	1922	46	496	696	1,192	(41) ^a	(58)	(38)
5,000-10,000 Towns 10	1917	9	173	233	406			
	1922	10	206	309	515	(36)	(55)	(45)
Above 10,000 Towns 6	1917	5	122	225	347			
	1922	5	188	291	479	(74)	(48)	(56)
Gains for all schools from which data were available for both named years						(44)	(56)	(41)

^a Per cents shown in parentheses are gained by figuring schools individually and algebraically combining their gains and losses. Total cases (31+9+5) 45 schools. Detail of information and method available in mimeograph form.

2. *Gain or loss per cent of girl, boy, and total graduates.*—

Table XVI shows, for most of the sixty-five towns visited, the ratio of male to female graduates in the classes of June 1917 and 1922 respectively. The towns are divided into three groups according to their populations in 1920. Data were not available for all because of no graduates in some years, a records system not comparable, loss of files by fire, etc. The averages are, therefore, based upon the schools, in each calculation set, for which the records are complete for both years. Losses which occurred are not shown but are included as referred to in the note which accompanies the table.

The figures tell us that the 1922 classes showed an increase of graduates, boys and girls together, of 41 per cent above the 1917 figures. We find that the number of girls increased 56 per cent and the boys 44 per cent. If the male graduates continue to increase at this rate and if we can fairly assume that an increase in the number finishing denotes a corresponding increase in time attended by those boys not graduated, we must conclude that provision must be made for more boys in all years and for proportionately more in the third and fourth. To extend our offering only in length without a broadening of the experiences open to election would seem a policy ill-adapted to the purposes of a democratic institution. While there is a filling of the ranks there must be a lowering of the average quality of individuals which means to us increased responsibility for industrial training.

Our table also indicates that the larger the school the less the girls gain and the more the boys gain in the number completing the program, and that the larger the system the greater is the total gain. Here we find justification for the increased expenditure for industrial work in the larger places.

3. *Facts about thirteen hundred recent boy graduates.*—In each of the sixty-five towns visited opportunity was taken to copy the full four-year record of all boy graduates (mid-year and close) for the years ending June 1917 and 1922 respectively. For various reasons, previously listed, records either were not available or were not in form comparable with those already in hand. There are, however, usable data from 45 of the 65 schools for the class of 1917 and from 59, for that of 1922. The total

numbers of individual records are 465 and 861, or a total of 1326 cases. These numerous records being from schools of considerable variety in size, organization, and program, seem to be sufficiently representative of the state condition to justify definite conclusions about a half dozen questions not all of which are treated in this section. Study is here made of the number who did and who did not present industrial credits for graduation, the amounts of such credit earned, etc.

TABLE XVII

THE PER CENT OF BOY GRADUATES EARNING INDUSTRIAL CREDITS TOWARD HIGH SCHOOL GRADUATION

Years	Schools Concerned	Boy Graduates	Without Ind. Courses	With Ind. Courses	Per Cent Having
1917	45	465	82	383	82.4
1922	59	861	177	684	79.4
Total	..	1,326	259	1,067	80.4

To learn that 80 per cent of our boy graduates make contact with the industrial departments, where they exist, is gratifying indeed. Some measure of their actual need for this experience will be presented a little later in connection with a canvass of the occupations in which they are found to be engaged. We answer next the question of how much of such credit is available and how much is accepted.

TABLE XVIII

THE AMOUNT OF INDUSTRIAL CREDIT EARNED TOWARD HIGH SCHOOL GRADUATION BY 1,067 BOYS IN THE CLASSES OF 1917 AND 1922

Classes of	Credits											Boys	Total Cred	Av. Cred.
	½	1	1½	2	2½	3	3½	4	4½	5+				
1917	11	101	20	135	22	54	7	19	2	12	383	793	2.07	
1922	25	176	48	238	41	75	24	36	6	15	684	1,404	2.05	
Totals	36	277	68	373	63	129	31	55	8	27	1,067	2,197	2.06	

One and two industrial credits of the sixteen required in all subjects combined are the most common earnings. What tendency there is apparent for the presenting of industrial credits in excess of two should be magnified many fold in our interpretations because of the fact that the great majority of schools offer

only two units of work. Facts on this point for 158 schools maintaining departments in the year of visitation are shown in our next table. The ten subjects there named were chosen because they are of the most common provision. (Incidentally these data reveal the unsettled condition as to sequence of the courses.) Reference should be made also to Table X.

TABLE XIX

INDUSTRIAL COURSES OFFERED BY HIGH SCHOOL YEARS AND THE UNITS OF CREDIT AVAILABLE IN EACH SUBJECT
(Minnesota state high schools, 1922-23)^a

Subjects	High School Years				Units of Credit, by Schools						Total Schools Included
	I	II	III	IV	½	1	1½	2	2½	3	
Woodwork	156	134	26	18	15	81	6	53	...	3	158
Mech. drawing ^b ..	100	98	45	30	16	77	7	24	...	1	125
Arch. drawing ..	...	1	4	3	1	3	...	...	...	...	4
Forging	3	4	13	4	3	8	1	2	...	...	14
Auto mechanics..	2	6	7	3	5	5	1	1	...	...	12
Machine shop...	1	2	1	2	1	1	1	...	...	...	3
Wood-turning ..	1	1	2	1	2	1	...	...	...	...	3
Printing	2	4	5	3	1	4	...	...	...	...	6
Electricity	2	3	2	1	2	1	...	2	...	...	5
Sheet metal	1	...	...	...	...	1	...	...	...	...	1

^a Data from unpublished reports to the state commissioner of education, total of 156 usable filings. Minneapolis, St. Paul, and Duluth not included.

^b Incidental to woodwork, not a separate course, in 31 schools.

There are now established the facts that eighty per cent of our male graduates elect, or are assigned to, industrial course work and that they pursue, in large majority, as much of such class work as the curriculum provides. As to the reasons for these choices we have no objective data but facts are at hand bearing upon the soundness of the policy from the viewpoint of future need or usefulness.

At the time of transcribing the four-year records of the male graduates attempt was made to learn the occupations of these young men since their completion of the program. For the boys of 1922, then in their first year out, the task was comparatively simple and the data relatively complete. Of the 861 cases for

1922 we were able to locate nearly 850. For the 465 boys of the 1917 group we have fairly accurate data on about 400 and some facts about most of the remainder. Record should be made here of gratitude for the courteous and painstaking assistance of superintendents, principals, and teachers in the gathering of these data. Appeals to alumni associations, commercial clubs, legion groups, employers, friends, and classmates were made in support of what the school files held and what facts were the personal knowledge of teachers and pupils. These appeals were made largely by the school office during the stay of the visitor but many facts were later found and mailed to the writer. There is only one regret—that we have no such complete record of the occupations of that great army of young men who for various reasons do not enroll for high school work or do not remain to its completion.

Table XX condenses the information relative to the present occupations of the 1922 boys and to both the present and the interim work of those of 1917. Classification is made according to the United States Census plan, 1 through 9 of the list, and there were added, necessarily, three additional groups: 10, those attending institutions of higher learning; 11, those attending business colleges or trade schools of less than college grade; and 12, those deceased and all others unclassifiable or not accounted for. Separate tabulation is made for graduates of schools located in towns of three selected size groups as it was thought that some distinct differences might be found. The columns headed "1917 During Six Years" cover 465 cases of present work plus 346 cases by change of occupation, or a total of 811 entries of what these 465 boys have done and are doing at the end of the six-year period. The two extreme right-hand columns classify in total and in per cents of the total the 1559 entries which are the sum of "1922 Present" and "1917 During Six Years." Our interest centers in what the boys have done as well as in what they are now doing because we desire to know the usefulness to them of industrial school work.

TABLE XX

THE OCCUPATIONS NOW PURSUED BY 861 MALE GRADUATES OF 1922 AND OF 465 FOR THE YEAR 1917, PLUS THE INTERIM OCCUPATIONS OF THE 1917 BOYS

Classes of Occupations U. S. Census Plan, with Three Additions	Present Work of the 1922 Boys			Present Work of the 1917 Boys			1917 During Six Years			Total 1922 & 2nd 1917	Per Cent of Total 1559
	Towns below 5,000	Towns 5,000 to 10,000	Towns over 10,000	Towns below 5,000	Towns 5,000 to 10,000	Towns over 10,000	Towns below 5,000	Towns 5,000 to 10,000	Towns over 10,000		
	All Sizes of Towns	All Sizes of Towns	All Sizes of Towns	All Sizes of Towns	All Sizes of Towns	All Sizes of Towns	All Sizes of Towns	All Sizes of Towns	All Sizes of Towns		
1. Agriculture, forestry, and animal husbandry	60	15	15	25	10	10	35	13	17	155	9.9
2. Extraction of minerals	15	7	4	5	1	1	7	3	2	38	2.4
3. Manufacturing and mechanical in- dustry	65	30	20	35	8	10	47	14	18	194	12.4
4. Transportation	5	5	3	3	5	0	6	7	1	27	1.7
5. Trade and commerce	70	25	10	40	20	25	55	27	35	222	14.2
6. Public service	5	2	1	10	5	5	12	7	5	32	2.1
7. Professional service	10	4	5	20	15	10	30	20	18	87	5.5
8. Domestic and personal service ...	3	1	1	0	2	2	0	4	3	12	0.8
9. Clerical work	15	14	10	13	12	15	19	17	19	94	6.0
10. Institutions of higher grade	170	83	110	3	15	20	93	50	70	576	36.9
11. Business colleges and trade schools	20	10	7	25	5	18	45	12	27	122	7.8
12. Deceased, no available data, etc. ...	25	6	10	27	25	20	27	25	20		
Nos. 10, 11, 12 added as required by the data	463	202	196	206	123	136	376	199	236	Grand Total Entries	1559
Total.....861 boys	Total.....861 boys			Total.....465 boys			Total.....811 entries				

As to the extent of changes in occupation by the 1917 boys, we have these interesting figures. Those from towns below 5000 people were 206 in number, of whom 75 had made one change; 36, two changes; 5, three changes; and 1, eight changes. Of the group of 123 from towns between 5000 and 10,000 we find that 44 have made one change; 13, two changes; 4, three changes; 9, four changes; and 14 are not accounted for. Those from towns above 10,000, 136 in number, conducted themselves as follows: 31 made one change; 16, two changes; 1, three changes; and for 6 we have no data. These changes combine to give us the excess of 346 entries of occupational type used in the table and mentioned above. The graduates of the smaller schools are shown to have changed employments more often on the average during the six years.

Interesting and instructive as are the comparisons between graduates of the two selected years and of the high schools in towns of the three named sizes as to their present work, our conclusions must be based on the per cent distribution shown at the extreme right of the table. We may fairly assume that those engaged in the first four classes of employment (total 26.4 per cent) now have rather direct use for the type of information and of skill usually imparted by industrial courses. Many of those engaged in the next five classes, trade and commerce, public service, professional service, domestic and personal, and clerical service, have direct need and many others would find the training incidentally useful. Of these five classes, totaling 28.6 per cent, it seems reasonable to state arbitrarily that 15 per cent would have profited by industrial instruction or training. Of the 44.7 per cent still in institutions of higher learning and in vocational schools of less than college grade, yet to enter their fields of livelihood, we assume that 25 per cent will later find this special training an asset. Addition of these three supposed per cents ($26+15+25$) shows 66 per cent of the boys now employed or to be employed in types of work for which we can see a distinct need for the special training. The writer's experience and close interest in the work lead him naturally to a very strong, if not a biased, regard for the merits of this special instruction. It is his feeling that if the aims later to be discussed are valid and if the materials of instruction are selected,

organized, and presented with purpose to realize each and every one of these objectives, this course work deserves a place among the constants of the high school program. When we can show direct need on the part of two thirds of the boys graduated; when we consider the large number who do not remain to complete the course; when we know that increased enrolment means gradually decreased average ability; when we consider the home membership and general environmental and social values on equal footing with the skills; when all these and other like factors are taken into account one is forced to the conclusion that all high schools should maintain industrial departments and that all boys enrolled should have contact of some duration with them.

Earlier figures have shown that 82 of the 465 boys graduated in 1917 and 177 of the 861 graduated in 1922 completed their work without pursuing any industrial courses. How are these now employed? Have they no need for, or would they now be greatly helped by these skills, facts, and appreciations?

The 82 graduates (1917) who had no touch with high school industrial course work are *now* (after six years) occupied as follows:

10 retail salesmen	3 quarrymen	1 insurance man
7 students	2 lawyers	1 missionary
6 clerical workers	2 garage men	1 expressman
6 farm workers	2 electricians	1 policeman
6 laborers	2 industrial teachers	1 real estate agent
4 army and navy men	1 mail carrier	1 bank worker
4 salesmen	1 athletic coach	1 plumber
3 miners	1 dentist	15 deceased, no data, etc.

The 177 graduates (1922) who had no high school industrial courses are accounted for as follows, in the first year after graduation:

80 students	3 carpenters	1 paper millman
20 farm workers	3 musicians	1 section hand, railroad
11 laborers	3 business students	1 law clerk
7 retail salesman	3 electricians	1 trade student
6 clerical workers	2 mill workers	1 reporter
6 factory helpers	2 lumber mill men	1 road builder
5 bank workers	1 hospital helper	1 flour millman
5 teachers	1 truck driver	1 miner
4 drug clerks	1 telegrapher	6 deceased, no data, etc.

The 1067 classmates of these boys averaged 2.06 credits of industrial work and one has the feeling, as he canvasses the employments of these 259, that none of them would have been handicapped by a like amount. He feels that he would like even now, by some mysterious process, to subtract from the training of these boys some certain two units and to hand to them in their place the kind and amount of content pointed toward industrial intelligence which was experienced by the majority of their classmates. Even the increased contact with men teachers during these formative years is worthy of consideration.

G. SUMMARY AND CONCLUSIONS

(Numbered consecutively throughout the study. For earlier numbers see page 26.)

12. In our state the size of town is not a dependable index of the size of the high school. There is much consolidation and transportation of students so that industrial work is made available to many rural boys to whom under other conditions it would be denied.

13. The towns of the state may be roughly divided into three classes—those of one or two special industries, those of numerous and varied small manufacturing plants, and the rural and residential villages, of which last type there is a majority.

14. In the sixty-five representative towns visited (selected as to size, scatter in state, type of working community, type of school organization, type of industrial department) the industrial subjects are offered in the following order of frequency: bench woodwork, mechanical drawing, architectural drawing, carpentry, automobile mechanics, electricity, printing, machine shop practice, sheet metal work, machine design, and home mechanics.

15. There is great variety in the subjects offered, their sequence, the time allotted, the number of instructors, the space provision and division, the election and compulsion, etc. Administrators are privileged to attempt what they feel will help to realize their general educational aims and policies and what is practicable under their special operating conditions. Notwithstanding this desirable latitude we need some measure of standardization, especially in what is offered, lengths of courses, and hours per week.

16. As to the industrial credits available or open to election the mode is distinctly at two units with as many schools providing for more than two as for less than two. Given the space and facilities, administrators generally would increase the offering to four units. This condition now obtains in ten per cent of the schools of the state and a few permit election beyond four credits in special cases.

17. Minnesota high schools make a generous offering of subjects which aid in the realization of at least one of the objectives of industrial course

work, i.e., the development of industrial and social intelligence and adaptability. More than one half of the high schools offer economics, commercial arithmetic, and commercial geography; more than one fourth, commercial law, vocational or community civics, and social problems; while there is a scattered provision of office practice, business English, salesmanship, industrial history, and the like. We urge that the offering of these subjects be not taken as justification for the curtailment of lecture work by industrial teachers.

18. The most common length of school year is 36 weeks. The most common school period is of 45 minutes duration, with a tendency toward the 60-minute period. The prevailing time allotment for shop work and drawing is 1 double period each week for grades seven and eight and 5 double periods for high school students. This gives 48 clock hours and 240 clock hours per year to these respective groups. Suggestion is made that the time allotted to seventh grade, eighth grade, and high school work be set uniformly at 2, 3, and 5 double periods, respectively, per week.

19. The size of classes averages 15 students with a range from 5 to 28. Suggestion will be made later as to means of caring for larger groups. There is little of mixed class personnel in the grades, though this condition is a problem in the high school. Twenty-five per cent of the freshman, 46 per cent of the sophomore, 61 per cent of the junior, and 43 per cent of the senior classes were found to contain students not so classified in the school organization. This condition increases teaching difficulty and compels an uneconomical use of the instructor's preparation and instruction hours.

20. Where several industrial teachers are employed they commonly instruct students through a range of six school years, the assumption being that if a man know his subjects he serves all classes equally well if they come to him in fairly close attainment grouping. To continue the present practice would seem to defeat the wish of many teachers to know and to teach a particular age or type of students and to change the emphasis from subject-matter to student growth in ideals and activities, as well as skills. Teacher trainers in this field feel it a hopeless task to try to prepare men to use methods appropriate to so wide a range of class groups.

21. The total high school enrolment is made up of 60 per cent girls and 40 per cent boys. In the four classes there is little variance from these figures, the ratios being: first year 55 and 45 per cent, second year 61 and 39, third year 60 and 40, and fourth year 60 and 39 per cent. Of the boys enrolled in all schools 47 per cent elect industrial courses. Great differences among the four years obtain in this respect because of the limitation of offering beyond the second year. The per cents of boys electing work by school years are 67, 53, 25, and 21, respectively.

22. Administrators expressed themselves as to the type of boys who commonly elect these special courses. They do not differ from other boys of the school in conduct, general purposeful demeanor, homes represented, and the extra-curricular activities in which they are engaged. Nothing

could be learned objectively about native ability. Altho considerable testing has been done little data were available because the facts had not been made a part of the case histories of students.

23. Many high schools do not maintain industrial departments. In the present year there are 45 schools, exceeding one hundred students in enrolment, that make no provision and the towns represented range in population up to 3000. For true equality of opportunity all high school boys of the state should be privileged to make contact with these course materials so vital for guidance and for other social ends.

24. The per cent of the total enrolment who are graduated from Minnesota high schools increases slightly faster than the enrolment itself so that we have a constantly greater number to provide for in all years. In forty-five schools for which we have complete data there was an increase for boys and girls together of 41 per cent in the last five-year period, and for boys alone the per cent of increase was 44. This points us to provision not only for more boys in all years but for proportionately more in the third and fourth years. We find also that the larger the school the more the boys gain, which fact affords justification for the more extensive and intensive offerings in the larger places.

25. Eighty per cent of 1326 recent graduates of high schools maintaining industrial departments presented industrial credits for graduation. They earned an average of 2.06 industrial units, chiefly in woodwork and mechanical drawing, and presented a range of from 0.5 to 5.0 units out of the 16 required. The most frequent earning was two units because two units is the very common provision, but a strong tendency is shown for the election of all that may be offered. No data are at hand on the credit earnings of the large number who did not complete the high school program.

26. Classified according to the United States census plan the 1326 boys of the combined classes of 1917 and 1922 are now distributed in occupations such that two thirds of them may be said to be making very direct or significant incidental use of what they may have learned in industrial courses. Two hundred fifty-nine boys who had no industrial training are now largely employed in types of work for which this training would be an asset. These facts, coupled with that of gradually lowering average ability in the student body which must accompany increased enrolment, lead us to the conclusion that industrial work in some amount should be made a constant in the high school program for boys.

CHAPTER III

EQUIPMENT, COURSE MATERIALS, AND PHYSICAL PRODUCT

A. FOREWORD

Some reluctance is acknowledged about the use of so extensive a space as is necessary to place before readers the details of equipment, course materials, and physical product in our numerous subjects. These details are, however, so desirable for reference as the paper proceeds—so effective for the consideration of objectives, methods, teacher preparation, and suggestions—that their inclusion seems wholly justified. For those not closely interested in relationships these particulars will of themselves be interesting and helpful. They will serve the teacher as a source for comparison of his own shop conditions and his own assignments of work with those of teachers in other situations and they should have an influence upon the definition of unit content.

The intention is here to record *for each of the subjects usually offered* the space provisions, the common and individual equipments, the processes taught, and the projects and jobs assigned. The facts on methods, classroom management, and the informational effort are reserved for later intensive treatment as detached from specific subjects.

Woodwork and mechanical drawing, universal subjects, will be discussed first and in fuller detail than those to follow. Under *woodwork* will be mentioned the varied activities of the general shop and under *mechanical drawing* the whole attempt in the graphic fields. Such other subjects as are discussed following will then be assumed to be offered as special units altho much more infrequently.

B. BENCH WOODWORK AND ASSOCIATE EXPERIENCES

(Base number for all comparisons sixty-five towns)

The average amount of floor space devoted to instruction in woodwork alone (and in the majority of places this comprises the complete shop offering) is about one thousand square feet.

Single benches are most common, there being forty-two of the wood shops so equipped. The usual built-in equipment, in addition to benches, are tool racks, panels, and cabinets; bulletin boards; cupboards and bins; material racks; blackboards; and long work benches with metal working vises. If division of space is made by supporting walls or built-in partitions there is commonly a combination storeroom and finish room besides the shop, altho some have a room for each of bench work, machine wood-work, gluing, finishing, tools, storage, wash place, and display purposes. There is a noticeable tendency in the smaller places to divide the available full space, by partially glazed partitions, so that the entire department is at one time under the eye of the instructor.

The writer formed judgments on the natural lighting of the wood shops as follows: 30, good; 20, fair; 10, poor; and 5 intolerably bad. Fifty-three had a more or less efficient system of artificial lighting.

Some 40 schools provide bench sets of common tools, and 7 towns maintain individual sets for all boys enrolled in the courses. Modification of this latter plan is made in 18 cases where boys have for their own use certain edged tools such as chisels and plane bits. The tools most frequently made a part of the bench or individual sets are as follows, the numbers indicating how many towns out of 55 include each of them: marking gauge, 55; hack saw, 53; chisels, 55 (1 inch, $\frac{1}{2}$ inch, $\frac{1}{4}$ inch, and $\frac{3}{4}$ inch, most common in this order 30, 37, 38 and 15); jack plane, 52; try-square, 52; brush, 50; bench hook, 49; mallet, 43; rules, 55 (2 foot straight, and 2 foot folding most common, 25 and 21); block plane, 18; and screw driver, 9. The variety of other tools found much less frequently in these bench and individual sets is great. Some of us will be interested in the low frequencies for a few of the tools once very common—winding sticks, 1; spoke shave, 6; sloyd knife, 7.

It would be an almost endless task to name the tools possessed by the schools for general use beyond the bench sets. No attempt was made to gather this data. On the whole the shops are well furnished with these necessities and for the most part have them in good working condition and convenient for use. Note was taken, however, of the number of schools that possess certain

tools and devices which determine to a degree the type of work that may be done or the extent to which a type may be done. Examples follow: good sets of clamps in 50 schools; miter box, 49; universal plane, 35; iron vise, 32; glass cutter, 32; metal drill, 21; wiring kit, 18; pipe dies, 15; soldering and brazing outfits, 22; forges, 11; riveting machines, 7; cement tools, 8; glue press, 2; picture frame vise, 2; steam box, 6; and fume chest, 2.

The larger equipment, especially power driven machinery was made the subject of rather close checking with these findings: universal saw, 26; lathe, (except special turning rooms) 21; band saw, 23; jointer, 21; mortiser, 12; planer, 10; sander, 8; grinders—universal, 8; floor, 18; bench, 31. A considerable number of the schools employ no power whatever. Where there is machinery the individual drive tends to take the place of shafting. Where no power had been installed the teacher was asked which machine he would most appreciate and his usual reply was, "some kind of a saw" because he is well aware that the educational value of the ripping process comes to an end early with young boys. Choices after the saw were in order of preference the lathe, grinder, sander, and band saw.

A few schools have provided themselves with inexpensive beginning equipments in various fields not clearly related to wood-working but of close correlation with the work of the farm owner. Without scheduled class work, simply during a part of the wood-working hours, we find boys learning to mix a little concrete and cement; to do rough soldering; and to repair harness, machinery, and electric devices.

The varied activities of the woodworking courses are perhaps best expressed in terms of the operations or processes opened to the experience of students. Check was made of the most common of these but their sequence could not be determined; in fact it is not established. *All* instructors present the squaring up of stock, beveling and chamfering, boring, straight chiseling, gluing, cleaning, sandpapering, and finishing with stain. Processes of less frequency by number of towns, are as follows:¹ fitting of hinges and locks, 63; varnishing, 63; painting, 62; waxing, 61;

¹ Some activities, not purely of the woodworking type but engaged in as supplementary, are included.

filling, 61; rub down and oil finish, 60; drawer construction, 59; shellacing, 63; upholstering, 57; panel construction, 55; the wiring of lamps, 55; metal trim, 41; gouge chiseling, 39; bolting, 36; fiber cord, cane, and rush weaving, 34; bell-wiring, 28; iron vise work, 19; soldering, 18; forging, 7; concrete work, 7; leather work, 7; rope work, 6; elements of pattern-making, 6; fuming, 4; and inlaying, 4.

The most common woodworking joints are the butt, half lap, mortise and tenon (common, through, keyed, and blind), dovetail, miter, dowel, and cross lap. The range of these in a single school is from eight to fifteen separate joints learned by each boy. They are most often taught in connection with project work, altho a dozen men were found still to believe in the execution of joints as such.

The projects or jobs attempted vary with the grades. It may be said that in the *seventh grade and below* the boys work upon the following pieces with most frequency: flat piece and assembled toys, blotter and calendar pads, match scratchers, cutting boards, picture frames, broom holders, bookracks, necktie racks, bird houses, sleeve boards, windmills, doll furniture, game boards, coat hangers, key racks, and a variety of small boxes. These are executed in designs largely standardized for each class and follow each other in the order chosen by the instructor as best for the acquirement of the necessary first skills. The more adept boys work upon larger projects. Some express themselves through special designs of kites, flower sticks, kiddy cars, aeroplanes, cabinets, and sleds.

In the *eighth grade* bench work we find, as before, an infinite variety of projects attempted. Space consideration permits mention of only those common to fifty per cent of the schools visited. They are footstools, bookracks, magazine racks, sleds and skiis, book ends, plant and telephone stands, medicine cabinets, necktie holders, pedestals and tabourets, bird houses, wastebaskets, sleeve boards, game boards, ferneries, and toys. One is reluctant to omit a hundred other common projects for they form an array indicative of the interests of boys, their desires to please their parents and friends, and their instinctive inventiveness.

For *high school boys* we shall give more detail, to aid us in the conclusion that these boys, with the elementary skills acquired,

are perhaps not spending their shop hours on the best advised types of work. We shall divide their physical output into *what they make for themselves or their homes, what they do in upkeep of the industrial department, what they do for the school as a whole, and what they do for the community.* Here again we shall be limited to mention of those projects or jobs common to half of the schools visited.

Jobs for Themselves and Their Homes

Chairs	Footstools	Porch swings
Tables	Piano benches	Ferneries
Cedar chests	Medicine cabinets	Music cabinets
Bookracks and cases	Ironing boards	Sewing cabinets
Pedestals	Wastebaskets	Tabourets
Desks	Costumers	Telephone stands
Morris chairs	Tea carts	Radio cabinets
Hall trees	Davenport	Canoes and boats
Phonograph cases	Tool boxes	Toboggans and sleds

Jobs for the School Shop

Tool boards and cabinets	Partitions and floors
Bench fixtures and lathe boxes	Lockers
First aid cabinets	Drawing boards, cabinets, and tables
Lumber racks	Vise blocks and handles
Motor stands	Nail, screw, and bolt cupboards

Jobs for the School System in General (Construction)

Bulletin boards	Window boxes	Kindergarten equipment
Bookcases	Play scenery	Normal training desks
Shelves	Filing cabinets	Typewriter tables
Magazine racks	Umbrella racks	Domestic science tables
Window screens	Bicycle racks	Benches and lockers
Athletic equipment	Playground apparatus	Greenhouse equipment
	(Upkeep activities)	

Repair and refinish of chairs, desks, and tables; work on curtains, door locks, window latches; slight building changes, floor repairs; setting up of shop equipment, school lockers, and desks.

Community Service, Not General

Auditorium equipment, a warming house for ice rink, a municipal bathhouse complete, park benches, bleachers for athletic field, pedestals, cases, etc., for public library, churches, and fraternal organizations, store window display standards, and blackboards for homes.

For the Farm Home, Not General

Hog rack	Hayrack	Eveners
Chicken coop	Wagon box	Wood rack
Poultry feeder	Wagon jack	Seed corn tester
Shoveling board	Shipping crate	Gate
Harness rack	Sack holder	Beehive

To show that in some places the general repair and construction work is not inconsiderable and perhaps underestimated by the board of education and taxpayers, liberty is taken to give details of these activities in three schools.

School A.—Two months' work or from the opening of school until the time of visitation: 3 drawing tables, 10 pointers and batons, 3 bulletin boards, 2 first aid boxes, 1 magazine rack, 2 lockers, 2 letter and word racks for primary grades, 2 typewriter tables, a 15-foot folding screen, 1 canvas cot, 1 kindergarten table, 1 sand table, play scenery, repair of 6 chairs, some experimental laboratory equipment, shelving, and flower boxes.

School B.—Scattered over a year: bulletin boards, flower stands, magazine rack, instructor's desk, piano bench, tool chest, table lamp, bookkeeping desk, typewriting table, bedroom equipment for domestic science department, trophy case, pedestal, fernery, wastebasket, normal training table.

School C.—Eight months previous to visit: two sets of play blocks, chisel handles, drill case, mallets, work bench, set of toy furniture, dresser, table, bed, key cases, twelve library tables, ironing boards, easel, chairs, sink frames, lathe boxes, picture frame, and repair of tables, desk, and cupboards. Estimated saving \$750.97 according to books kept by instructor.

Wood-turning constitutes so essential a part of the wood-working experiences of boys that we shall treat it with some fullness. Thirty-two schools were found to offer boys work at the lathe either individually or in groups. A lathe or two in the bench room or mill room is always a welcome sight. One has a feeling that aside from the connection of turning with cabinet-making and pattern work, boys profit greatly by a knowledge of this activity even tho they may acquire only the most elementary skill.

The most common phases presented are gouging, skewing, beading, v-cutting, face plate and chuck work, and polishing. Leading among the jobs and projects are tool and vise handles, mallets and gavels, trays, nut bowls and goblets, smoking stands, table and floor lamps, candlesticks, baseball bats, Indian clubs and dumbbells, napkin rings and jewelry boxes, rolling pins and

potato mashers, and legs and other parts of furniture projects. Usually a set of exercises precedes the project work.

Virginia has an especially attractive equipment and conducts an excellent course in turning. Mr. H. J. Weiland, the instructor, does considerable demonstration work beyond the grade boy's ability, thus extending his appreciation and helping him in his decision on high school electives.

Carpentry is, in most of the schools visited, rather an extension of the bench woodworking and cabinet-making courses than a unit for special election. The more mature boys, skilled in the use of common tools, are advised to select single or co-operative projects in rough carpentry and occasionally they advance to the finer phases of the trade. Groups engage in the laying of joists and studding, roof framing, boarding in, rough and top flooring, outside and interior finish, window and door-fitting, lathing, shingling, and stair-building. Some construct concrete forms, others work on models even to the plastering, painting, and varnishing of the various parts of them, and others do a great deal of the repair and construction work necessary about the building. Several portable garages, cornercribs, and warming houses were seen and one could not but be greatly appreciative of the instructional difficulties overcome and the value of these activities to the boys.

A most interesting experiment in the field of carpentry training is in progress at South St. Paul under Mr. S. O. Werner, instructor. A group of over-age boys who probably are soon to leave full time schooling under necessity of self-support, are placed under the supervision of the instructor full time and an attempt is made to prepare them for wage-earning in the building lines. The construction of garages, bungalows, and houses is undertaken by doing such of the work as can be done by the group and subletting other parts to commercial men.

Often an entire building, except the plastering, is done by the boys. The instructor maintains for the sole use of his group a specially fitted room where manipulative and related instruction is combined on days when the bad weather or other circumstances make construction impractical. Here the boys learn the drawing, blue print-reading, mathematics, science, and estimating necessary to be known and suitable to their capacities. On the whole this seems to be an activity of unquestionable merit and one worthy of close examination by the heads of departments in other places.

C. MECHANICAL AND ARCHITECTURAL DRAWING

By computation the average floor space assigned to drawing activities is slightly less than 600 square feet or is a room twenty by thirty feet in dimensions. There is wide variation in both directions from this average room, and special mention should be made of the fact that seven schools provide no special room but do their drawing in the shops. Fifteen schools use the group benches but the most common equipment is single tables or desks for the accommodation of a dozen to twenty boys. There are usually a blackboard, a bulletin board, files for completed work, cupboards and racks for drawing boards and T-squares and such aids as blue printing frames, projection box, and trimmer. Judgment was made of such physical conditions as light, heat, ventilation, and general adaptability of the rooms for drawing purposes as follows: very good, 5; good, 38; fair, 17; poor, 5. Artificial light is provided in 56 schools—46 direct and 10 indirect.

Thirty-seven of the 65 schools own and lend the drawing instruments; 47 furnish T-squares, triangles, and boards; and 28 furnish all supplies of paper, inks, erasers, etc. In the remaining places students purchase what they need in varying amounts and at varying standard prices. The fees or costs incident to drawing instruction are, however, in no sense prohibitive and do not much effect the numbers of students electing the work.

All save one of the schools visited offer drawing, either scheduled or incidental, somewhere between grades seven and twelve. The teacher in the one school where no offering is made justified the dropping of the subject by the assertion that the boys took no interest in it. In many places it is continuously a part of all shop subjects pursued and in others continuously parallel to them. We may say that, in round numbers, separately scheduled units of drawing for grade boys are offered in 15 towns and for high school boys in 45 towns of the 65 visited. The lengths of these scheduled units show no similarity. Three places offer a 6-week, two hours a week, course at the opening of the freshman year. It is usual either to divide the freshman year and to give half of it to woodwork and half to drawing, or to open drawing to election for half a year at the completion of a full year of woodwork.

No discussion is to be made in this section of the methods employed by teachers of drawing but the title of this part of our bulletin permits the naming of the phases most commonly presented and the objects commonly selected for drawing drills. The numbers following the phases named indicate in how many towns of the 65 they are made a part of the training:

Use of instruments	59	Sections	42
Lettering	59	Tracing	37
Dimensioning	59	Perspective, instrumental	36
Conventions, mechanical	55	Blue printing	33
Geometric constructions	55	Conventions, architectural	22
Orthographic projection	49	Perspective, free-hand	20
Isometric	48		

In most schools the boys make sketches and working drawings of the projects to be constructed during shop hours. In 42 towns there is work upon machine parts; in 31, upon house plans and architectural details; in 22, some work in sheet metal developments; and in 6 places the tracing of electric wiring and plumbing diagrams, auto ignition systems, and the space relations in printing.

An examination of plates completed and in process as well as of courses of study definitely planned throughout yielded the fact that the purely mechanical objects or pieces selected for portrayal are few as compared with those of a more architectural or wood construction type. We find boys responsible very often for instrument exercises, lettering and line plates, geometric problems and drawing of blocks, boxes, pen trays, try squares, work benches, drawing cabinets, racks, tabourets, and library tables. Much less frequently they are employed upon face plates, brackets, bearings, thread forms, screws, pulleys, and standard bolts. There is very little done upon pieces of machinery from the object. One has a feeling that the term mechanical drawing connotes a type of work all too infrequently in evidence at present. Also, that too much of the class time is given to manipulation and the effort for a finished technique when the average adult has perhaps a greater need for skill in interpretation and the taking off of quantities.

The elements of architecture are made a part of the mechanical course in most instances altho there are numerous cases of

a special architectural offering, a semester or a year in length. In either case the work is largely upon lettering, conventions, framing, elevations, floor plans, details of general construction, stairs, windows and doors, built-in features, and estimates.

D. MACHINE SHOP PRACTICE AND FORGING

Seven of the larger systems have installed machine equipments for metal-working and conduct scheduled classes in this subject while a few others have placed a metal-working lathe and certain other common machines in their automobile departments as necessary for proper instruction. Forging loses ground as a scheduled subject and some full equipments are being discarded. There is a growing tendency, however, to retain a forge or two with its accessories for the supplementing of farm shop work, general woodwork, automobile, and machine instruction.

The machine shop equipment in four towns is here detailed. *St. Cloud*—three engine lathes (one 15-inch and two 11-inch), a 20-inch drill press, a 14-inch power saw, a 10-inch grinder, a 16-inch shaper, 10 metal-working vises, space for 12 students and individual bench sets including square, bevel, scribe, calipers, rule, and dividers. There is direct physical connection with the automotive and electrical departments. *Red Wing*—2 engine lathes, 1 friction drill, 1 shaper, 1 milling machine, 1 power saw, power emory and water grinders, long benches with vises. *Virginia*—8 lathes, 2 grinders, 1 radial drill, 1 speed drill, 1 shaper, 1 milling machine, 1 power saw. *Eveleth*—3 lathes, 1 shaper, 1 planer, 1 milling machine, 2 drill presses, 1 universal and 1 floor grinder, 1 power saw, 1 arbor press, and long benches with vises. Rochester, Mankato, and Aurora are similarly equipped. The space provided ranges from 800 to 2500 square feet, including tool rooms or cages, stockrooms, and wash places.

The most frequent processes are grinding; chipping and filing; polishing; horizontal, vertical, and angular shaper work; plain, vertical, fluting, and gear work on the miller; horizontal, side, thread, taper, bore, plate work, and knurling cuts at the lathe; the use of micrometer and calipers; automatic feeds, etc. The most common order of the work is bench, shaper, planer, lathe, and milling machine. Exercise pieces are usually given to open the

work of any type and the projects and jobs assigned are of great variety. Common among these are V-blocks, paper weights, center punches, screw drivers, lathe centers, bolts, set screws, angle plates, clamps, wrenches, plumb bobs, jackscrews, machine vises, pipe vises, gear work, brass and bronze bushings, couplings, and machine castings for small grinders, lathes, drill presses, glue presses, and sanders. Innumerable odd jobs which come in the general work of the various departments afford practical drills.

Common forge processes are upsetting, drawing out, bending, forming, tempering, and welding. The variety of projects, aside from general upkeep jobs, are hammers, eye pins, rings, rope hooks, links, gate hooks, center punches and nail sets, cold chisels, tongs, wrenches, sled runners, knives, and small tools. The towns maintaining rather complete outfits and giving rather formalized instruction in forging are Virginia with 10 forges; Winona with 12; Red Wing with 12; Eveleth with six, and a power hammer; Mankato with 6; and Aurora with 4. There are besides the anvil and forge accessories a generous sprinkling of punches, shears, bench outfits, drills, grinders, etc. The departments average about seven hundred square feet in floor area and are equipped with tool cabinets or rooms and wash places.

E. PATTERN-MAKING AND FOUNDRY PRACTICE

Only 6 cities feel the necessity to offer special courses in pattern-making and but 1 of the 65 visited has a foundry. Altho these are perhaps at least one half of the number that might justifiably make these offerings one feels that boys in other places are denied experiences and insights very necessary in the interpretation of environment. Suggestion is made that in some way, if only by demonstration, in connection with other courses, all teachers plan during each year to acquaint boys with the main conceptions of these two basic trades. Time taken from wood-work or drawing to learn of these two great steps in the passing from conception and graphic expression to the completed metal product certainly would not be time misspent.

Common parts of pattern-making work in these beginning courses are single and split patterns, cores and core boxes, movable part patterns, segment work, and sweeps. What is not

attempted by boys is illustrated for their information. They learn of sands, draft, shrinkage, finish, and the adaptability of metals.

Recurring projects and jobs are exercise pieces, wrenches, surface plates and angle irons, gear blocks, anvils, engine parts, pulleys, washers, jacks, bushings, and machinery parts.

The one foundry, at Virginia, is equipped with 1 Whiting cupola, 1 Obermayer brass furnace, 1 core oven, one 20-inch rattler, one 14x19 air squeezer machine, hand tools, and flasks. Iron, brass, and aluminum are run each for a thirteen-week period, one hour daily. The products are frying pans, waffle irons, router planes, lamp bases, bushings, scrapers, spoke shaves, plane handles, clamp fixtures, marking gauges, trammel points, and candlesticks. Commercial work has been begun through contract with a local foundry. The school will furnish castings at a school pace and at prices commensurate with the foundry production cost.

F. ELEMENTARY ELECTRICITY

Half a dozen cities have sensed the need for elementary skills and appreciations in the general field of electricity and have made provision for drills in wiring and the study of common equipment and devices. There seems so much to commend this practice that we shall hope to see its rapid expansion, not particularly as a special branch with individual shops, as in the larger cities, but as a part of the general industrial training of the boys in all of our schools.

It is perhaps not worth while to attempt here to list the necessary equipment for this elementary work. Nor would it be wise to explain the extensive provision made in some places visited where the advanced work is done with vocational training intent. The point should be made that much worth while instruction can be given with no extension of space and very little equipment. It is a growing practice to provide for the students large wiring boards, which can be laid upon the wood shop benches while work is being done, and then to erect in a corner of the room rough frames where side wall and ceiling exercises can be conducted.

Instruction, as met with, included general principles and facts about currents, conductors, generators, batteries, circuits, pressure, and measurement. Boys were seen at work upon doorbells, simple lighting circuits, lamps, flatirons, toasters, small motors, radio sets, switchboards, annunciators, and the like. Various suggestive courses are now in print and the instructor of average preparation need feel no reluctance to begin this type of work. The one suggestion which needs most to be made is that there should be little similarity between the industrial course in elementary electricity and what is done in this field with general science groups.

G. SHEET METAL WORK

The number of places where the work in sheet metal was seen was less than ten but these were sufficient to impress one with the interest manifested by boys and the probably great value of this activity, especially from the viewpoint of the consumer. The rooms were generally equipped with long tables, placed in the center, for the machine work and with benches for individual work and the stock, product, and tool cabinets ranged along the walls. The most complete equipment was found at Eveleth and is here detailed: squaring, ring, and slitting shears; folding machine; forming machine; large and small turning, burring, and wiring machines; setting-down and double-seaming machines; groover, crimping, beading, and elbow-edging machine; brake, and folder. These are placed on long tables with pipe standards. Small tool sets are adjusted to sixteen tool boards which can be taken by boys and fitted to sockets in their benches, during class periods. A glass tool case and display panel adds much to the appearance of the room. At Hastings, Faribault, Detroit, Owatonna, Aurora, and South St. Paul the equipment is slightly less complete than that at Eveleth but is sufficient for their purposes.

The chief processes are laying out, gauging, cutting, forming, soldering, riveting, punching, folding and hemming, turning, burring, seaming, wiring, crimping, and beading. Much work is done in pattern development. Small projects that were most often in evidence are cups, funnels, scoops and measures, cutters, dustpans, boxes and pans for various purposes, and lamp shades. Some boys were engaged in work on pails, garbage cans, pipe and

elbows, poultry-watering devices, chimney tops, and simple cornice work.

H. PRINTING

The educational value of courses in printing is being recognized more rapidly, perhaps, than that of others of our newer subjects. There was opportunity to examine the equipment and course work in nine of the sixty-five places visited. In two other places small presses were a part of the general school equipment and various teachers with their pupils took the opportunity to experiment with them for initial knowledges and for the meager products of their trials. At Mantorville, one of the small towns credited with special course work in this subject, Mr. L. F. Knowles, now of St. Paul, has shown the possibility of large returns from small outlay. With little equipment, few students (many very young), and generous spirit he gave this small school a creditable annual and added a considerable amount to the general educational advantages of students. He taught printing under conditions which are supposed to preclude this possibility. On the strength of this and other cases less marked we urge the introduction of this subject, even in a very small way, by a large number of schools. Until it shall seem justifiable to equip a separate room and to schedule the course, a type case and small press may be set up in the drawing room and used incidentally. The least provision will bring student interest and other returns sufficient to assure its extension and the coming of the new course.

The equipments in two Range schools are given here in detail but without the intention to urge such completeness for all other schools. These layouts make strictly vocational work possible. *Eveleth*—2 job presses, imposing table and stone, 5 double case stands, proof press, ink and roller cabinet, stitcher, punch, cutter, 4 type cabinets, galley cabinet, individual galleys, etc. *Virginia*—3 job presses, 200 cases type, 12 practice cases of 10 point, lino-type, proof press, 2 stones, roller and ink cabinet, cut cabinet, drying rack, lead and slug cutter, mitering machine, power stitcher, foot stapler, perforator, punch, hand cutter, galley rack, brass rules and galleys, steel sticks, space for a dozen boys at cases.

The processes are: learning the case; elementary straight composition of prose and poetry; proof-reading, punctuation, and spelling drills; paragraph and display composition; special job work; make-up and feeding; colors; cutting, stitching, and binding; and estimating. The projects and jobs, usually done for the school system, include library cards, tickets, programs, office record forms, bill and letterheads, spelling lists and flash cards, posters, motto cards, commercial blanks, invitations and menus, ribbons, and tardy and absence slips. Where there is a school paper or yearbook there is co-operation with English classes and class officers and committees to the ends of much learning and the reduction of cost.

I. AUTOMOBILE MECHANICS AND REPAIR

Gas engine and special automotive work was inspected in nine towns and was found to cover the range from the most elementary principles and jobs to definite trade work in repair. Some teachers organize the work phase-fashion and cover such topics as engines, carburetors, ignition, cooling systems, starting and lighting, clutches, transmission, radiators, storage batteries, fuels and lubricants, springs, tires, and body types. Others proceed job fashion, presenting theoretical matter as the work proceeds. Boys learn carbon cleaning, valve-grinding, tracing ignition, bearing-fitting, brake adjustment, valve-timing, brazing and welding, straightening of axles, adjustment of wheels and lights, testing, and the like. Work is done upon school cars and busses, and upon automobiles brought in from homes represented in the classes. Almost no commercial jobs are done. Detail of equipments at Virginia and Eveleth are given as before but with the same suggestion that effective work can be done with less and that schools need not wait for introduction until large sums are available. *Eveleth*—crane, motor stand, Dodge chassis, Nash 6 motor, Studebaker 6, Regal 8, Knight, Hupmobile, Ford, and Waukesha motors, Fairbanks-Morse 3 h.p. engine, Curtiss aeroplane engine plus small tools and appliances of every description. There is close co-operation with the machine and forge departments. Two shops are maintained, an upstairs room 30x40 for

laboratory work and a lower 40x40 work room. *Virginia*—special building on land facing central school property, shop 40x50 and ignition room 10x22, with much other space including a classroom. Lathe, drill press, universal grinder, 2-ton arbor press, crane, motor stands, elevator, portable welding machine, cleaning vat, stands for wiring panels, Northway, Studebaker 6, Reo 6, Mitchell, Case, Ford, Maxwell, and Continental 6 motors and Nash chassis.

J. HOME MECHANICS

A new type of grade work known as home mechanics has begun to take its place in the industrial offering in the state. Briefly it is the presenting, under a general name, of a variety of experiences useful as preparation for the upkeep of a home. It has much to commend it. It appeals to boys and their parents as thoroly practical; it calls for the use of a great variety of our commonest tools and for the learning of many homely processes; it is inexpensive and interesting. Mr. Fred Lawshe, at South St. Paul, offers this course in a composite shop equipped about as follows: eight single benches with wood sets, a table, 3x12 feet, with wood and iron vises, a bench grinder, and bench drill; wall racks for drawing boards, T-squares, and triangles; a stain table with cabinet for supplies and work in progress; small table for blow torch and soldering kit; sheet metal table, 3x12 feet, with burring, turning, and wiring machines; and another for roller, mandrel, vises, and general tools. The course is divided into four types of home repair ("what mother or father needs") namely wood, iron, sheet metal, and electricity. The boys are helped and supervised in their free attempts to construct and repair on such jobs as follows: shelving, breadboards, waste-baskets and furniture upkeep; flatirons, table lamps, toasters, percolators, and small motors; umbrella racks, flatiron stands, hack saws, shelf brackets, paper knives, long handled dustpan, chicken-watering devices; simple soldering of pots and pans.

Mr. R. A. Pottsmith, of Virginia, in his statement of aims for the course, remarks that the work is "prevocational in character," "teaches lessons which are of real value in everyday life," and permits of "problems of common occurrence in which the student can show and make use of what initiative he may

possess." "The instructor's work is one of guidance rather than of total direction and the students' attitude one of interest rather than submissive obedience." Printed instructions, suggestions, and blue prints are furnished and there is choice among projects or jobs assigned in groups.

K. SUMMARY AND CONCLUSIONS

(Numbered consecutively throughout the study. For earlier numbers see pages 26 and 54.)

(The chapter here concluded records, for each of ten industrial subjects, the space provisions, the common and individual equipments, the processes taught, and the projects or jobs assigned. Such detail being difficult to summarize, the following paragraphs should not be interpreted to convey, so well as in other cases, the materials of the chapter.)

27. For *woodwork* the single benches are most common. Most schools employ bench sets of the common tools but there is a tendency toward limited individual (for each boy *enrolled*) equipment. The shops are generally well furnished, tools being of the best grade. Light is poor in more than one half of the shops. Five-sixths have artificial lighting more or less efficient. Tools used in fields other than wood are uncommon (soldering outfits, cement tools, electric wiring outfits), although these determine to a degree the type of experience that may be given. Two thirds of the schools are without power machinery. All would profit by installation of at least a saw and a wood lathe. Where power is employed the individual drive tends to supplant shafting.

28. The tool processes taught, the joints required to be learned, etc., are quite uniform but their sequence is not established. Projects and jobs vary with the grades. In the early years designs are largely standardized. High school classes, with elementary skills acquired, are perhaps not spending their time on the best advised projects and jobs. Too many things are done which average living and mixed employments will not require again to be done. There is too little co-operative effort in the shops and little opportunity to learn about quantity production methods. The amount of money saved for the community through class jobs is greatly underestimated and should be made a matter of annual record. Even within the school each department should be credited with what it supplies and each one charged with what it receives. Any efficient plan of cost accounting comprehends such records.

29. *Wood-turning* is experienced incidentally or through group work in only one half the schools. Aside from its relation to cabinet-making and pattern-making its extension is justified by the consumer's knowledge afforded. Every school should provide this experience in some amount. *Carpentry* is now commonly but an upgrading or variation of the bench courses and well deserves place as a definite elective unit.

30. Virtually all schools teach *drawing* incidentally or on schedule. Seven provide no special space. Light is poor in one-half the rooms; seven-eighths have artificial lighting, usually direct, and often quite ineffective because of placement and the absence of drops. More than one-half the schools provide all equipment free of charge or by rental, but the costs are nowhere prohibitive. The work is commonly incidental in the grades and scheduled in the high school. Some schools make it continuously a part of all shop subjects while others keep it continuously parallel to the shop-work or assign it to free election. Many make distinct offerings in mechanical and architectural drawing, and machine design.

31. There is wide variety in the phases of drawing presented and no established sequence. There seems to be altogether too little of freehand work and too much of the "copy" procedure. Too much attention is given to technique with a consequent underemphasis upon interpretation and the taking off of quantities. Little work is done from the object and projects follow too closely the cabinet type to the exclusion of work on machine parts, architectural plans and details, sheet metal layouts, and wiring and plumbing diagrams.

32. *Machine shopwork* is still of limited offering but such shops as are maintained are more uniform in equipment and attempt than are the more mature wood departments. *Forging* loses as a scheduled subject but the tendency to employ a forge or two in supplement of the work in certain other departments extends noticeably and is commended.

33. *Pattern-making and foundry practice* are negligible as separate offerings, as they must be in small systems. There should, however, be devised direct methods for the exposition, if only by demonstration, of the nature of these two basic trades. These are two highly important steps in the passing from conception and graphic expression to the completed metal part or piece.

34. *Electrical work* evidences a rather rapid acceptance as a school experience, particularly elementary wiring and the study of common home equipment and devices. By the use of individual wiring boards, placed during class periods upon the wood benches, much worth while instruction is being given with little additional cost. Several schools maintain electrical departments.

35. The work in *sheet metal* observed in ten schools assures interest on the part of boys and considerable appreciation content, aside from the increasing preliminary or pre-trade possibilities.

36. The educational value of *printing* gains recognition rapidly and here again we get large returns for small outlay in space and money. Introduction by all schools, even in a very meager way, is urged. A type case and small press placed in the drawing room and used irregularly will soon encourage more worthy acceptance of place in the program. Opposition of a local printer may be met by the fact that to commit a community to printing matter is but steadily to increase his business. If he will co-operate

to start the department he will always be satisfied and pleased with its accomplishment and the part that he has played.

37. The work in *automobile mechanics and repair*, observed in nine schools, spreads from the most elementary conceptions and skills to definite trade tasks and the equipments are correspondingly varied. Some instructors organize their work phase fashion, lecturing and overseeing laboratory work on engines, carburetors, ignition, and the like. Others put boys at once on a series of jobs such as carbon-cleaning, valve-grinding, bearing-fitting, etc. Which of these methods is the better can be decided only after decision as to the objectives of the school, the department, and the course.

38. Interest increases in a mixture or grouping of elementary processes, in a variety of mediums, to form a course known as *home mechanics*. Work is assigned younger boys, usually eighth graders, in general repair of home electrical devices, furniture, kitchen utensils, etc. There is much to justify this course, particularly that it appeals to boys and parents as practical, that it fosters interest in home upkeep, that it calls for the use of a variety of the most common tools, and that it is an inexpensive offering.

39. Administrators are committed to and have equipped their departments for a kind and amount of work which results in increased knowledge of industrial life and preliminary skills rather than in definite trade training. Altho increased provision will be made for occupational preparation for certain small groups, the cosmopolitan high school will perhaps never attempt finishing courses in the trades. The necessity for highly skilled artisans will become better understood and the conception that industry offers place to men of the highest general ability will take root. Then we shall witness in the great trade-training institutions of the urban centers an enrolment from the distance not incomparable with the present enrolment in colleges preparing for the professions of engineering, medicine, and law.

CHAPTER IV

METHODS, CLASSROOM MANAGEMENT, AND THE INFORMATIONAL ELEMENT

A. GENERAL STATEMENT

There is reluctance to open discussion of the conditions suggested by our title, for it is concerning these things so vitally effecting our whole purpose that one must record a near approach to failure or omission. There seems to be no deep appreciation of method, little of established procedure in classroom management, and a seeming purposeful neglect of the broad, informational cultural elements of our subjects. The attitude toward materials and students, the conduct of classes, and the division of time indicates a questionable emphasis or a great narrowing of aim. There must not be censure of all schools and teachers indiscriminately, for there are those departments who make one glad with their sense of the real meaning of it all and the bend of their every effort to the realization of worth-while ends. In the main, however, it is true that the atmosphere of the departments is not a school atmosphere and that the apparent aim is to begin and to end jobs for their own sakes. There seems to be a pointing always toward the completion of projects, for their showing or possession, and little of other intent.

One finds less than ten per cent of the class time given to demonstration or group presentation. Few teachers make use of basic texts, except in drawing. Notebooks, assigned readings, classroom discussion, homework, examinations, and information standards are rare. There is little correlation with other school departments and subjects. Course outlines are not complete and clear, lecture plans are missing, and objective teaching devices are few. The primary duty seems to be the helping of boys, as rapidly and as well as possible, to construct and to repair what they or the school may desire. There is an all too constant and eager preparation for the annual exhibit of product which occasion is a part of the year's plan in fifty-two of the sixty-five towns visited. The writer is of the opinion that this same *Annual Exhibit* is a time and thing of harm rather than help to our work

for it commits boys and teachers, superintendents, boards, and public to a constant consideration of skill when skill should be only incidental. Our job is largely an informational one. We should strive to give our boys those experiences and that fund of information that will help them mentally, physically, and socially to meet the demands of average living and of any calling.

General industrial training is comparable to general science or general mathematics—a course or set of courses of generally educational value to all pupils whether or not they expect later to specialize in industrial work. No one will dispute the statement that shop subjects have extensive and interesting content. The course materials of drawing and printing and electricity are definite and almost as well organized as the materials of English and mathematics. The sequence of tool processes and the properties of material in most of these fields are as well known as the facts and the interdependence of the facts in geography and history. We simply make the mistake of being content to keep boys busy in the shops making things and fixing things. We try to develop skills and rarely succeed in having boys arrive at skills that are marketable. We do not pay enough attention to how boys learn or what they learn by the doing. This is why the value of our courses is frequently questioned. This is why we are asked so clearly to justify the offering of programs, the cost of which, initial and operating, is comparatively great.

B. THE INFLUENCE OF PHYSICAL ARRANGEMENT UPON INSTRUCTION AND RESULTS

Obviously for group teaching, and we assume that this should be a part of our work, we must have a suitable place. Only 5 of the schools visited have a special lecture room or provision for the free use of one of the regular recitation rooms by the instructors of this special department. Fourteen schools, exclusive of the 5, have chairs in the workrooms where boys may sit comfortably for related and general instruction. Fifty-two have blackboards, usually small and commonly covered by old material. Twenty-two have shop bulletin boards but little of material to make their use effective. They are used to display finished pieces or to hang certain charts for long periods, when

the value of such boards is to present good things in variety and with frequent changes. Exhibit panels or cases are found rather frequently and are worth while for their effect in the indirect raising of standards. Some schools distribute first grade pieces in the assembly halls, corridors, and the windows of stores where they mutely lead to the appreciation of good quality in materials and workmanship.

Panels and cases for the convenient arrangement of general tools are common, altho instructors vary greatly in the interest shown and planning done to make them attractive. Individual bench sets are often kept in orderly fashion but more often scattered with scrap, in the drawers of benches. Often there are cupboards or lockers for clothing or work in progress but more often the possessions of boys are scattered in confusion and one does not look further for the cause of inaccuracy, untidyness, and lack of interest in the jobs selected or assigned. In thirty-five towns no check system for tools is in use, boys simply helping themselves with quickness and replacing tools at leisure and with reluctance. In the other schools a boy of each class is made responsible for the rack or case or special tool room and in this way gains a valuable training in addition to his guarantee that tools are kept in use and are in place at the close of the period.

There is no uniform ruling on shop dress in fifty-eight of the towns but in the others there is the requirement of apron or coveralls, the removal of coats, rolling of sleeves, and the like. (In one class of 14 boys 7 were seen at work in heavy sweaters.) Stock is open to the free use of boys in 12 schools while in the remainder its taking is supervised and in 19 a bill of materials is required to be presented.

Shops are swept by boys at the close of each period in 21 of the schools, by the last class for the day in 10 others, and in the remainder by the cleaning force. Aside from the consideration of dust raised by frequent sweeping one feels like urging that the responsibility of a class should not extend below machine and bench tops. To sweep the floor is not degrading but its disciplinary value is not now stressed. The fact that janitors refuse to assume this duty should not deter the industrial teacher from insisting on his equality, in this respect, with other teachers of the building.

Power machines, where a part of the equipment, are well guarded except for the infrequent use of floor matting about them. Grade pupils are commonly denied their use and high school boys use them only after instruction. Starting and operation are usually subject to special permission of the instructor and in four cases the administration requires written consent of parents before their use is allowed. Their placement for effective work cannot be made a detailed part of this paper but it must be a matter of common knowledge that studied arrangement will facilitate the work and minimize the chances of injury.

Before passing to general method and management attempt should again be made to make it clear that the adverse criticism here made does not apply to all departments and instructors. Certain of the men have shown great ingenuity and expended untold time and energy to put their domains into the best possible arrangement for teaching and for production. One finds for example at Winona and at Aurora excellent recitation rooms with seating capacity sufficiently great and with demonstration places, blackboards, teachers' desks, and such other equipment as give them appearance of broad objective. Several men tower above their work and have every detail of equipment and procedure worked out to the advantage of boys and themselves. The writer is not a pessimist nor one dissatisfied with what we are accomplishing in the main but he does feel that there are some conditions in this situation desirable above all others. These are new viewpoints regarding aims and a general heightening of tone in the departments. And he would point out by this section that there is a very close relationship between good teaching and the developed proper physical arrangement for good teaching.

C. METHODS AND CLASS CONDUCT

1. *In the shops.*—It has already been remarked that little provision has been made for group instruction under conditions apt to be productive of results. In fact the writer heard almost no teaching which could be analyzed and classified in any array of methods or types of instruction. In the nearly one hundred days which he spent in visitation only three men subjected their class

methods to his observation and two of these were teaching drawing so that their classes were seated by reason of the nature of the subject. There is no intention to affirm that shop instructors do no group teaching, but if there is a worth-while amount of time spent in this way it is reasonable that the writer would have found it in the course of many weeks spent in many schools, usually a full day or more in a place. Nor was the individual instruction observed of a type sufficiently definite to permit classification. One can best characterize the procedure by saying that boys were at work with instructors ready to help them individually as their needs arose. The call for assistance came much more often from some pupils than from others of each group, which was the expectation and which was probably due in part to bad grouping. It is true, however, that where group work is done to the end that boys know before they begin, what they are to do and how they are to do it, the individual help required is much reduced. If our classes are to operate chiefly on an individual basis we have great need for sets of definite, step-by-step, job sheets or working layouts comparable to those used in many types of commercial manufacture. Under present practice the instructor's day is extremely arduous and his efforts not effective in high degree. The men differ, naturally, in their control of this difficult situation. One man will exhibit poise and seem to be always in complete control of things, boys coming to him quietly at his desk or work place and courteously awaiting turn to be advised. Another teacher will flounder all day in work of a dozen kinds with the boys, being half the time surrounded by a jostling group impatient for his help.

This difference in generalship was at no time more apparent than when boys were coming into the shops. It was noted that only 15 of the 110 men seen at work had a definite time for roll call and made it a formal process. The boys hurried to find their places of work and their projects and set about their duties with no thought but that the period was theirs and the main object of the hour was to advance toward completion of the physical product. The writer would have been more pleased to see them come in with expectancy that the instructor had something of interest to tell them or show them—something allied to but above

and beyond the jobs in hand. Even to sit for a moment for roll call and instructions or to submit questions, relevant or not to the immediate tasks, would be a source of help to the boys and an indication to them that their leader was not only a man skilled and versed in matters of the trade but a professional person, employed in a public institution having certain social aims and responsibilities. The procedure of closing a period is worthy also of thought and organization to the end that there may always be time to leave work and workplace shipshape and to pass from the shop with a sense of pride in that no duty or obligation has been slighted. Haste is made here to commend the working spirit of the boys and their general demeanor in the shops, lest these pages be interpreted by some to indicate a generally confused condition and an improper attitude on their part toward superiors and property. Academic classes suffer greatly in comparison when we consider happiness in work, eagerness for results, and purposeful activity.

The methods of assignment of work in the various schools need explanation here for the bearing they have upon the realization of our aims. Only 37 of the 65 schools plan any group shop projects for their pupils. Boys work largely in these schools and wholly in the other 28 upon individual jobs. Only 21 schools plan combination jobs wherein two or more materials are brought together in the same project. Only 38 recognize the changes of the seasons in their attempt to strike responsive chords of interest in the younger boys. All schools allow students to plan and to complete work for themselves and their homes while only 24 do anything helpful for the community at large. Much construction and repair work is done for the department and the school. There is almost no definite co-operation with industrial firms, farmers, or retail merchants whose interest must be held and whose appreciation should be cultivated. In 33 schools boys work from sketches which they make or from drawings furnished by the instructor. There is opportunity in very few places for boys to learn by contact of the use of jigs, the duplication of parts, the relation of foreman to crew or workman to helper. These data are mentioned to emphasize the fact that we are not using all possible avenues to a knowledge on the part of students of

the actual conditions of industrial life. Men do not generally work alone upon single pieces of work. They do not, during the day's work, construct and repair things for themselves. Market commodities are rarely wholly of one material. Life jobs are done largely from specifications and under stress of the shortage of time. Men command some men and take orders from others so that the sum total of serviceful living is co-operative work. Our shopwork should match these conditions closer than at present.

2. *In the drawing rooms.*—Most of the work of drawing is done by the individual method. A group of boys are introduced, at the opening of the course, to the first of a series of specifications for plates to be made. Before all have completed the first assignment many are upon a second and a third and soon the individuals are scattered over half or more of the series of plates. The instructor passes from table to table pointing out errors and suggesting what is needed for the pupils' progress. Thus he spends time and energy in continuous repetition of the same suggestions and criticisms. As boys complete the required exercises they are either assigned additional ones or are excused for the term and give themselves to increased study in other subjects.

The writer suggests a different method of procedure, modifications of which are now in use in twelve schools. When plate one is assigned there would be a talk by the instructor, a black-board demonstration, a textbook assignment, or some other scheme to assure that all boys knew how to do the work. Then from previous experience the instructor would set a time limit for the plate and at the end of the set number of class periods or clock hours the work for all would conclude and the paper be taken from the board. The same plan would be followed with each individual exercise, there being variety in the amounts of time allowed for them. Pupils slow in drawing would then have to put in more time at it, at home preferably, just as they make up deficiencies in English, algebra, or general science. Claim is made for this plan that more work can be done, that the average student can be brought to do more independent thinking, and that the instructor will save time for other duties. A teacher unwilling to make a complete change to this plan is urged

to conduct two comparable classes under the two methods and to make note of his results. For the more advanced and special types of work the individual plan will probably be preferred by all.

Altho texts as such or as used for reference are common in the schools it is felt that students are not made sufficiently dependent upon their use. It would seem that more definite assignments to the printed portions could be made and more rigid compliance with the request to study them demanded. There is nothing to justify a teacher's continually telling boys what they cannot avoid learning if sufficient and proper use is made of the text and references provided.

Teachers were found to differ greatly in their handling of the drawing work, so that while boys in some schools are made self-reliant, in other schools they follow the lead of better students. Some boys are brought to a highly developed ability in visualization and others complete the exercises in a manner betokening no imagination, little study, and much copying. Some men surround their students with drawings beautifully executed, while others present them little or nothing to motivate good work. Some allow many pencil plates before inking is attempted while others steal the ardor of pupils by insistence upon rather perfect completion of each plate as it is made. Some work only for good technique while others strive rather to give boys the ability to interpret drawings and plans, which ability is the one of the two more apt to be constantly an asset. So we might continue, but these instances will suffice to show that the teaching of drawing invites study and that he will do well who will give time not so much to the question of what his boys shall draw but of how he shall best bring to them conceptions of the value of the subject and skills and appreciations within its scope.

3. *Teaching aids and devices.*—Altho it would be perhaps more convenient for them to do so, industrial teachers have not surrounded themselves as have instructors in academic fields with objective devices for use in presentations. Many have done remarkably well in this particular but so many have done so little that it is appropriate here to introduce a list which will at

least be suggestive. There is no attempt at classification by subjects, but merely a mixed list of aids in which one may discover something of value to him in his work.

Tool and machine charts	Catalogs and journals
Joints in process	Stain and paint panels
Mounts of leaves, barks, etc.	Nail and screw exhibits
Models of engines	Leather samples
Valves opened in section	Jars to show cement elements
Tables and scales	Exhibits of oils
Demonstration saws	Projection boxes
Roofing, plaster board, etc.	Ends of lumber stock
Skeleton of rafter work	Panel and drawer models
Electric wiring exhibit	Cutaway cells
Development charts of chisels, files, etc.	Machinery parts
Tables of equivalents	Stages in forgings
Color charts for tempering	Standards in bolts and nuts
Pulley and blocks	Geometric figures
Gear types	Slide rule
Springs and balances	Photographs
	Instruments of measurement

Our special journals bring these things to our attention constantly. Especially attractive are the offers of manufacturers to send literature of an educational advertising nature. This material has been gathered and culled for a half dozen years by the writer and he will mail, upon request, a list of very useful publications which those who issue will be pleased to supply singly or in quantity. The attention of readers is called to two recent contributions to our literature which list educational exhibit materials.^{1, 2}

4. *The books most frequently used.*—Space forbids the naming of all books used as texts and references in the several subjects in the sixty-five departments visited, altho these were listed in full by the writer as a matter of information for his classes and in preparation for a further study. We need badly a close analysis of what our books contain, what amounts of space are given to the phases treated, and what parts of books or books-in-whole are most adapted to work for different ages and purposes. There are named below brief lists, in several fields, of

¹ FREDERICK K. BRANOM, Free geographic material. *Chicago Schools Journal* 6: 216-23. February, 1924.

² GEORGE R. RANOW, Educational exhibits—A neglected opportunity. *Educational Administration and Supervision* 9: 499-502. November, 1923.

those books most frequently provided. Order of frequency by towns is shown but no intention is entertained to specify these as the preferred orders. Indeed, the writer would recommend the use of many books not now used commonly enough to give them place in these abbreviated data. As appended material in a recent text, he has listed good books and journals in many school branches and trade fields.³

Bench woodwork and cabinet-making.—Griffith: Correlated Courses in Woodwork and Mechanical Drawing, Essentials in Wood-Working, Woodwork for Secondary Schools, Carpentry; Burton: School Shop Projects Based on Community Problems; Crawshaw: Problems in Furniture Making; Noyes: Design and Construction in Wood, Handwork in Wood; Windoes: Cedar Chests and How To Make Them; Holstead: Manual Training for the Grades; Siepert: Bird Houses That Boys Can Build; Roehl: Agricultural Woodworking.

Mechanical and architectural drawing.—Bennett: Grammar Grade Problems in Mechanical Drawing; Crawshaw and Phillips: Mechanical Drawing for Secondary Schools; Berg and Kronquist: Mechanical Drawing Problems; Windoes and Campbell: Architectural Drawing; Griffith: Correlated Courses; French and Svenson: Mechanical Drawing for High Schools; French: Engineering Drawing.

Electrical work.—Willoughby: Practical Electricity for Beginners; Timbie: Essentials of Electricity; Weber: Electrical Construction; Croft: Wiring for Light and Power.

Machine shop practice and forging.—American Machinist's Handbook; Friese: Farm Blacksmithing; Colvin and Stanley: Machine Shop Primer; Bacon: Forge Work; Palmateer: Elementary Machine Shop Practice.

Sheet metal work.—Broemel: Sheetmetal Workers' Manual; Dougherty: Essentials of Sheetmetal Work and Pattern Drafting; Longfield: Sheetmetal Drafting.

Automobile mechanics.—Dyke's Encyclopedia; Wright: Auto Repair I; Page: The Modern Gasoline Automobile; Kuns: Automotive Trade Training.

Printing.—Hague: Textbook in Printing Occupations; Henry: Printing for School and Shop; Loomis: Progressive Exercises in Typography.

Pattern-making.—Crawshaw: Problems in Pattern Making; Hanley: Wood Pattern Making.

Canvass should be made by teachers of the industrial subjects of the standard and newer books in their special fields and each man should possess the latest catalogs of all publishers who specialize in manual training and trade literature.

³ HOMER J. SMITH, English for boys and men. New York: Ginn and Company. 1923. Pages 301-20.

5. *Available periodical literature.*—Examination was made of the kinds and amounts of periodical literature placed at the disposal of high school pupils in all towns visited. Lists were procured of the magazines of all types purchased by the Boards of Education for the school libraries. There were added to these lists all periodicals taken by individual teachers, when it was evident that all issues of a journal were regularly placed at the disposal of students. (Daily and weekly papers, school exchanges, etc., were omitted and no record was taken of the duplication of copies of a given periodical in a school.)

The following table shows the very great range in the numbers of periodicals available in the various schools. From 2 regular journals in 2 schools to 77 in a single school is a step of which one is barely able to conceive. Fifteen schools are found to provide 10 or less journals and 18 schools 30 or more.

Magazines	Schools	Magazines	Schools	Magazines	Schools
2	2	16	1	33	1
3	1	17	3	34	1
4	1	19	3	39	1
5	1	20	1	41	1
6	3	21	1	43	2
7	1	22	2	44	1
8	1	24	3	45	1
9	2	26	1	47	1
10	3	28	1	49	1
11	2	29	2	57	1
12	3	30	1	59	1
13	2	31	2	61	1
14	7	32	1	77	1

Average number magazines..... 22

Different journals listed 246

Space does not permit of our showing what particular journals are made available where the number is low, but the reader is assured that no well-defined aims were met in their selection. Evidence is clear that thousands of students have access to a great wealth of good material while other thousands are stricken with as great poverty of amount and of content.

The twelve journals of highest frequency, regardless of their classification (65 schools, the base) are as follows:

59 Industrial-Arts Magazine	31 Outlook
49 Literary Digest	31 American Magazine
47 National Geographic Magazine	30 World's Work
41 Industrial Education Magazine	29 Independent
37 Popular Mechanics	29 Popular Science Monthly
35 Good Housekeeping	28 Review of Reviews

The journals taken by ten or more schools in a rather indefinite but useful classification are listed below:

General—49 *Literary Digest*, 47 *National Geographic*, 37 *Popular Mechanics*, 35 *Good Housekeeping*, 31 *Outlook* and *American*, 30 *World's Work*, 29 *Independent*, 28 *Review of Reviews*, 26 *Scientific American*, 22 *Youth's Companion* and *Atlantic Monthly*, 20 *American Boy*, 17 *Mentor*, 14 *Survey*, *Harpers*, and *St. Nicholas*, 12 *Saturday Evening Post*, 11 *Ladies Home Journal*, 10 *Asia*, and *Delineator*.

Professional—59 *Industrial Arts Magazine*, 41 *Industrial Education Magazine*, 27 *National School Digest*, 24 *Normal Instructor*, 18 *School Review*, 17 *American School Board Journal*, *Elementary School Journal*, and *Journal of Geography*, 16 *Journal of Home Economics*, 14 *Gregg Writer* and *School Arts*, 10 *Primary Education* and *English Journal*.

Vocational to a degree—29 *Popular Science Monthly*, 22 *Furniture Manufacturer* and *Artisan*, 18 *Country Gentleman*, 13 *American Cookery*, 11 *Breeder's Gazette*, 10 *Hoard's Dairyman*.

Significant data are here given on certain periodicals of interest to boys and useful for industrial information. The first numbers indicate the schools possessing each journal out of sixty-five schools visited. Numbers following in parentheses are the numbers of magazines of which the same is true and from which the few were selected.

- 9 *Boy's Life*, *Radio News*, *System* (10)
- 8 *Farm Mechanics* (4)
- 7 *House Beautiful*, *Illustrated World*, *Science and Invention* (8)
- 6 *American Builder*, *Home and Garden*, *Inland Printer* (10)
- 5 *American Machinist* (10)
- 4 *Business*, *Printers Ink*, *Successful Farming*, *Vocational Education* (12)
- 3 *Auto Trade Journal*, *Dairy Farmer*, *Motor Age*, *National Builder*, *Outing*, *Radio Digest*, *Scientific Monthly*, *Sheetmetal Worker* (24)
- 2 *Building Age*, *Fur*, *Feathers and Fins*, *Field and Stream*, *Good Furniture*, *Industrial Management*, *Machinery*, *Physical Culture*, *Popular Radio*, *Woodworker*, *Wireless Age* (34)
- 1 *Advertising and Selling*, *Architecture*, *Automobile Topics*, *Automotive Industries*, *Auto Dealer and Repairer*, *Hardware Record*, *American*

Forestry, American Press, Carpenter and Builder, Aerial Age, Chemical Age, Concrete, Electrical Engineer, Electrical Review, Electrical World, Industry Illustrated, Industrial Engineer, Iron Age, Iron Trade Review, Motor Cycle, Motor World, Printing, Power, Printing Art, Photo Era, Radio Record, Safety News, Steam Power, World Market (94)

These data on 246 distinct periodicals found in use in the 65 schools visited lead us to two conclusions helpful in this chapter. (1) General reading materials, altho selected with care, far exceed in amount the materials of vocational help to high school students. (2) Boys' interests are not commonly as well recognized as those of girls. It is the writer's belief that industrial teachers need only to request, within reasonable cost limit, what they and their students can profitably use and that they should *formally* use much more reading materials than they do at present.

D. THE INFORMATIONAL ELEMENT

1. *What "lecture work" implies.*—Such lecture or group work as is now done, amounting to less than one tenth of the instruction, has very close relation to the jobs in hand. It has to do with the uses of tools, the processes involved, the materials to be worked upon and such other facts and suggestions as make possible good construction and repair. This is a very necessary part of our work and may well be a little further standardized. The writer groups just following lists of topics which he found some teachers to be using and some of which he has supplied. They are to be interpreted as indicative of a type rather than as set outlines worthy to be used in full or in the given order.

WOODWORK

Growth of trees, classes	Painting and decorating
Adaptability of woods	By-products
Cutting and transportation	Physical properties
Sawing and market sizes	Preservation
Seasoning	Furniture design
Grain	Builders hardware
Sandpapers	Nails, screws, and hinges
Glues, shellacs, etc.	Bits, chisels, files
Stains, paints, and varnishes	Glass, leather, reed
Oils and waxes	Wire, piping
Veneers and inlays	Abrasives
Joints, panels, and drawer construction	Rope, brushes
Upholstering	Period furniture
	Fireproofing

DRAWING

Papers and inks
 Makes of instruments
 Appreciation of design
 Classic orders
 Brick, tile, concrete
 Form, color, proportion

Handbooks
 History of drafting
 Building stones
 Wrought iron design
 Landscaping
 Rhythm, balance

MACHINE SHOP, FORGE, AND FOUNDRY

Early uses of metals
 Metallurgy of iron and steel
 Hardening, tempering, annealing
 Shrinkage and allowance
 Finishing cold metals
 Weights of castings
 Temperatures, fuels, fluxes
 Cores and ovens
 Drop forging and power hammers
 Organization of tool rooms
 Oxygen and acetylene tanks

Crude oil products
 Hot metal and molds
 Cast and wrought iron
 Grades and kinds of steel
 Bessemer process
 Types of furnaces
 Types of tools
 Values of ores
 Sandblasting
 Smelting and alloys
 Precision instruments

SHEET METAL WORK

Adaptability of metals
 Pattern development
 Plating processes
 Galvanizing

History of the industry
 Standards of measure
 Chemistry of soldering
 Plumbing and heating codes

ELECTRICITY

Relation to magnetism
 Electrical instruments
 Conductivity
 Power, light, and heat
 Safety precautions
 History of street lighting
 Power dams and plants
 Manufacture of wire
 How a street car moves
 Electric codes

Signals and signs
 Symbols and their uses
 Art in fixtures
 Distribution
 The telephone and telegraph
 Radioactivity
 Types of insulators
 Electricity and the auto
 Burglar alarms
 Electric hoists

AUTOMOBILE

Metals and wood in frames
 Designs of automobiles
 History of auto manufacture
 Power losses
 Traffic laws and road rules
 Oils and greases

Manufacture of springs
 Garage methods
 Factory methods
 Manufacture of tires
 How parts got their names

PRINTING

Type metals	History of printing
Development of presses	Etching
Electroplating	Related art
Engraving	Proof-reading codes
Papers and inks	Multicolor work
Bookbinding	Rare prints

2. *A neglected type of information.*—Necessary as are the subjects suggested just preceding, there is a type of information now largely neglected which is of at least equal value. While the first type makes possible or motivates skilful manipulation the second results in that some thing which we call industrial intelligence. It raises or transfers thinking to another plane and functions in the furtherance of others of our aims. It develops world-wiseness and makes for adaptability to the social order and to the conditions of breadwinning.

Surely our students should be informed regarding the manufacture and uses of these materials with which they work or with which they will be continually surrounded:

Wire	Brick	Nails	Varnish	Felt
Rope	Paper	Screws	Rosin	Putty
Files	Solder	Bolts	Shellac	Asphalt
Glass	Cable	Leather	Isinglass	Tin
Cork	Chain	Glue	Celluloid	Pewter
Rubber	Pipe	Paint	Asbestos	Sandpaper
Ink	Wax	Stain	Slate	Paraffin
Brushes	Creosote	Oil	Aluminum	Ivory
Matches	Cut glass	Carpets	Movie film	Chinaware

They should be taught the meaning of many such terms as are listed below because these conceptions broaden one's understanding and are a necessary foundation for effective special reading:

Absorption	Impenetrability	Friction
Distillation	Fermentation	Acceleration
Adhesion	Work	Gravity
Capillarity	Power	Evaporation
Elasticity	Energy	Stress
Density	Horsepower	Strain
Permeability	Momentum	Shear
Malleability	Velocity	Surface tension

Bending moment	Refraction	Centrifugal force
Elastic limit	Displacement	Mechanical advantage
Refrigeration	Liquidation	Fermentation
Lubrication	Precipitation	Distillation
Adulteration	Atmospheric pressure	Corrosion

Would they not profit by discussion of the principles of operation of these and similar common devices?

Steam whistle	Airbrake	Hydraulic ram
Pipe organ	Chain hoist	Thermostat
Electric signs	Screw propeller	Gas meter
Phonograph	Steam turbine	Shock absorber
Passenger elevator	Pneumatic chisel	Traveling crane
Adding machine	Electric furnace	Cream separator

Who is better prepared than the industrial teacher to instruct boys on the subjects of popular interest and misunderstanding suggested by the following brief list?

Industrial accidents	Supply and demand	Child labor
Occupational diseases	History of manufacture	Profit sharing
Employers liability	Transportation	Factory inspection
Workmen's compensation	Minimum wages	Natural resources
	Labor organization	Industrial competition

Each instructor is master of detail and has the guidance responsibility to discuss his special subject after some such outline as follows:

National importance	Working conditions	Promotion routes
Source of materials	Methods of production	Special qualifications
Age of the industry	Training necessary	Hazards, health and injury
Comparative size	Places or methods of training	Other disadvantages
Specialization	Cost of training	Distribution of product
Organization	Beginning wages	
Labor demand		

E. STANDARDS AND MARKS

Few instructors were found to have devised formal schemes for the grading of student ability and accomplishment. In some cases plans were clear and record books or cards were in use which showed for an individual the amount and quality of the work performed and the comparative time taken to do an acceptable piece of work. These records were usually in terms of

projects or jobs rather than of processes. They often included notes on attitude, material waste, and conduct. The grading was found to be more definite in drawing than in the shop subjects. The most common entries were plates completed, neatness, accuracy, time, ability to interpret, skill in lettering, and information.

We have advanced toward the objective measurement of our results in a few places and it is urged that those who have developed workable plans place them before all of us through our professional journals. No small amount of such material is now in print and one marvels that the suggestions have not been more generally taken and applied. The industrial teacher's close contact with individual students and the possibility of his examining closely the material results of a boy's efforts should give validity to his assignment of grades. One factor probably modifies his judgment more than any other. It is that the completed work of the several boys has been done in varying amounts of time and with unequal amounts of assistance. We conclude that some formal plan of record should be used in all shops and that there should be objective measurement of what is acquired through classroom lectures and assigned readings and that the two records should be combined in some way for the course grade.

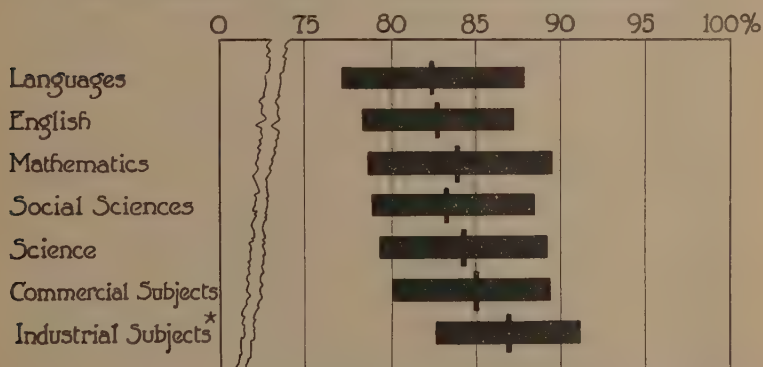
It has been stated previously that the writer collected transcripts of the full four-year records of all boys who graduated, from the high schools visited, in the classes of 1917 and 1922. The transcripts of the 1922 graduates were used to determine whether marks in industrial subjects were assigned in the same or a different range than those of academic subjects. Table XXI and Figure 7 show the results of this examination of grades in seven classes of subjects, one thousand grades in each class. The subject headings are to be interpreted as including all courses usually so classified; for example, *Social Science* covers ancient, medieval, modern, English, and American history, civics, social problems, etc. The one thousand marks used in each case include all marks whether of full year or half-year courses. The schools are representative of the state and the groups graduated by the schools are of varying sizes so that the condition shown is indicative of general practice. (In only one subject group, foreign language, were there less than 1000 marks available in

transcripts. These grades totaled 796 but the distribution shown in the table is an equated distribution, all columns being, therefore, comparable.) Grades were used from all records as they came at random whether or not boys had taken industrial courses.

FIGURE 7

MIDDLE FIFTY PERCENT RANGES AND MEDIANS OF ONE THOUSAND COURSE MARKS IN EACH OF SEVEN SUBJECT GROUPS

(Boy Graduates of Sixty-Five Minnesota High Schools, 1922)



* The only group of the seven which is commonly confined to boys. All grades used here for all subjects were, however, grades earned by boys.

Inquiry was made into the meanings of marks in the several schools but no special computations were made to equalize them, as deviations were found to offset themselves in such manner as to make this unnecessary. Only numerical grades were used. "Conditions" were difficult to determine but "failures" were counted and are shown in our table.

TABLE XXI

COMPARATIVE DISTRIBUTIONS OF ONE THOUSAND COURSE MARKS IN EACH OF SEVEN SUBJECT GROUPS

(Boy Graduates, 1922, in Sixty-Five Minnesota High Schools)

Subject Groups	65-69	70-74	75-79	80-84	85-89	90-94	95-100	Fail-ures
Languages	21	30	344	237	215	132	21	55
English	8	17	330	277	265	100	3	34
Mathematics	14	12	307	211	231	164	61	63
Social sciences ...	2	10	310	275	243	140	20	18
Sciences	11	25	247	259	251	147	60	41
Commercial subjects	7	9	214	254	315	184	17	15
Industrial subjects	..	8	102	262	327	253	48	5

Our data show that marks given in industrial subjects are distinctly the highest marks given in the schools and that failures in these subjects are in the least number. Either standards are lower or our means of judging accomplishment needs improvement. Consideration must, however, be given to the facts that industrial subjects are very largely elective and that grades are determined at present chiefly by mechanical output. Argument is not made for increased failures but for an increasingly better distribution of passing grades, better in the sense of more similarity with academic grades.

F. SUMMARY AND CONCLUSIONS

(Numbered consecutively throughout the study. For earlier numbers see pages 26, 54, and 73.)

40. There seems to be, on the part of a majority of our teachers, no deep appreciation of method, little of established procedure in class room management, and a great neglect of the broad, informational elements of our subjects. There is indication of questionable emphasis or a great narrowing of aim, a pointing toward the completion of pieces of work and little of other intent.

41. Less than ten per cent of the class time is given to group demonstration or presentation. (Only three teachers in a hundred days subjected their group teaching methods to the writer's observation.) Few teachers use basic texts, except in drawing, and here the policy is not general. Notebooks, assigned readings, class discussions, home work, examinations, and information standards are rare. Course outlines are not complete and clear, lecture plans are largely missing, and objective teaching devices are few. The *annual exhibit* as a formal, extensive feature of the year's work is probably responsible for this overemphasis on the skill side and it may well be discontinued.

42. Few schools have made physical provision for group teaching which provision we believe to be a necessity. In other respects most of the departments are equipped and arranged for effective instruction. A power saw, a wood lathe, and a forge are considered essential to the work in every school but they are not provided in more than half. Fifty per cent of the shops could be improved in appearance by closer attention to the provision of and attention to racks, cupboards, bins, tool boards, blackboards, and bulletin panels.

43. Individual methods, used in very great part in the shop teaching, would be improved by the provision of sets of definite, step-by-step, job sheets or working layouts comparable to those used in many types of productive industry. More rather than less of group teaching is however, strongly advised.

44. Teachers vary greatly in generalship as shown in the manner of their occupation during the time that the boys are at work, the way in which classes are received and disbanded, and their abilities to motivate quite, purposeful effort. They need to indicate more clearly that, besides being men of trade skills and knowledges, they are professional persons, employed in public institutions set up for the furtherance of social aims and responsibilities.

45. The selection of type projects and jobs is not always such as to give students a knowledge of the actual conditions of industrial employment. We need more school shop experiences that will call for co-operative work, that will include the joining of two or more different materials, that will give ideas of quantity production, and that will teach the relationships of men the one to the other, to superiors and underworkers, and to society as a whole.

46. The beginning work in drawing seems to be made too largely an individual matter and a plan of change is detailed in the text. Experiment with the two methods for purposes of comparison is urged.

47. It would seem advisable to use textbooks as bases for courses much more commonly than at present. Assuming that books selected for possession by students will need supplement, we believe that a fairly good text is better than none as it will give strength and organization to the work and save the teacher's time. Reference books are few in the departments and not plentiful or well selected in the general libraries. Periodical literature is, in amount and kind, more general than vocational and materials suited to the interests of boys are in less amount than those appropriate for girls.

48. "Lecture work" now implies instruction in the uses and care of tools, the processes carried on, the material's used, and other matters as closely related to the jobs at hand. Necessary as are these materials, there is a type of lecture, discussion, and assignment topics equally necessary and now largely neglected. It is the type that motivates and results in industrial intelligence, rather than skilful manipulation. It develops world-wiseness and makes for adaptability to the social order and to the conditions of breadwinning. (The text affords illustrative matter.)

49. There is great need for improving our formal schemes for grading student ability and accomplishment, most progress having been made to date in the grading of work in drawing. Altho industrial teachers can lay claim, for two or three reasons, to a highly valid assignment of grades, we feel that definite plans of record are necessary and that the items of judgment must include the time factor. It is urged, also, that there be objective measurement of what is acquired through lectures and readings and that these results be combined with shop grades to determine course marks.

50. On the basis of 1,000 course marks in *each* of seven high school subject groups industrial teachers are found to be of the most liberal in grading and least apt to give "failures." Suggestion is not made that there be more failures but that there be an increasingly better distribution of passing grades, better in the sense of more similarity with the marks assigned by teachers of other subjects.

CHAPTER V

MISCELLANEOUS RELATED ACTIVITIES

A. SHOPWORK FOR NORMAL TRAINING CLASSES

Ninety-six of our high schools maintain departments of Normal Training preparing groups of young ladies for service as rural teachers. Special instructors are provided and a year's instruction is given to a senior and graduate group who work through a full and definite program based on the needs and practices of the country schools. Of the ninety-six departments there are forty-six wherein the girls are given scheduled instruction in the industrial department of the school as a part of their training in addition to the handwork assigned and supervised by their special teachers. The writer was privileged to make inquiry regarding the aims and nature of this activity in thirty of the schools visited.

The size of these training classes in the present year ranges from eight to fifty-two students in the ninety-six schools of the state, a few finding it necessary to employ more than one special training teacher. The groups may be said to average about fifteen students so that the usual class coming under the instruction of the industrial teacher is of this convenient number.

The usual period is of forty minutes duration with a slight tendency toward the use of double periods per week for one-half the school year. Some offer the work daily for two, four, or six weeks and there are other schemes designed to concentrate the instruction.

The total time given to special industrial classwork each year was found to be considerably varied throughout the state, ranging from five to fifty clock hours as follows:

8 hours or less	in 9 schools
8 to 13 hours	in 11 schools
13 to 20 hours	in 12 schools
20 to 27 hours	in 6 schools
28 hours or more	in 8 schools

As to the objectives of the work there is some confusion in the minds of all of us. Occasion was taken to speak of aims when in conference on the subject with both the normal training and the industrial teachers. Certain of the classes of girls were also engaged in discussion as to the purpose of the instruction, their reactions toward it, and their suggestions for its improvement. Two general ideals or hopes seem to be most frequently entertained. (1) The instructors as well as the young ladies feel that the work is interesting and broadening to them and that it is therefore just so much more of general preparation for the tasks they soon will face. It gives them a knowledge of tools and processes and an appreciation of workmanship likely to be useful at all times, and it strengthens their general reading. It makes them more resourceful in the planning and execution of other types of manipulative work which are so much a part of the service of the teachers of lower grade pupils; (2) some look upon the acquirement of certain skills and knowledges as preparation in a more practical sense and hope to pass these on to their rural pupils in a semi-formal way. They tell us that many rural schools have limited industrial equipment and that where there is none it can be obtained with little difficulty. They assume that their service to the community will be more acceptable and their influence with the older students more productive if they are prepared to guide them in manipulative enterprises for the general upkeep of the school plant. By co-operative effort they could arrange flower boxes for the windows, keep seats in adjustment, out-buildings in repair, etc.

Accordingly the instructor of woodwork proceeds with this group much as he would with a group of young boys assigned him for their first instruction in woodwork. He teaches them to identify common woods, tools, and appliances; he leads them to some degree of perfection in first processes of sawing, squaring up stock, measuring, and simple joining; he supervises the construction of simple projects such as flat-piece toys, match boxes, coat hangers, bird houses, bread boards, bookracks, and doll furniture; he acquaints them with elementary sketching and the rudiments of color and stain finishes; often he introduces work in reed and raffia.

These, then, are the aims and the practices and we are left to our own conclusions. After having conferred with many of those most closely concerned the writer is inclined to believe that the activity should be encouraged. There is doubtless much of worth in both of the aims set forth but these aims will not be realized until they are thought through clearly and made the possession of the instructor as he teaches and of the young ladies as they learn.

It is suggested that not less than twelve clock hours (18 forty-minute periods) be given to this work each year and that these be scattered through at least a semester so that much more may be begun than can be done within the scheduled periods. It must be granted that no worth-while skills can be imparted and that the efforts of the industrial instructor should be directed to conferring and checking with the individuals upon their own plans rather than to bringing all to the completion of a defined and rigid set of processes or projects. It would seem appropriate that a great deal of lecture work be done and a notebook kept by the girls. Perhaps fifty per cent of the class time should be spent in this informational side of the work. It seems of little consequence whether a young teacher can exhibit a bird house or a toy which she has made, but it seems worth while that she be able to name the common tools, processes, and materials; that she know a few simple facts or principles in the fields of electricity and auto mechanics and machinery manufacture; that she know how printing is done and how papers and books are made. These are matters of general interest and a knowledge of them will aid her to interpret environment.

Finally, will not a group of persons closely interested bring their experience together to perfect a statement of objectives and a plan for their realization? The Department of Trade and Industrial Education of the University would welcome the results of such committee work for its guidance in teacher training. It is our desire to send men into the schools of the state prepared for the situations to be met. If the industrial work for the normal training girl is of sufficient worth to be continued and encouraged it constitutes a problem in teaching fitness which cannot be ignored. There should be a suggestive course outline, a time

designation, and a named method of approach—all determined after agreement as to the objectives to be attained.

B. INDUSTRIAL WORK FOR SUBNORMAL GROUPS

It is now quite generally recognized that there are among our school population a considerable number of children of insufficient mental quickness to assure their progress in their own age groups. A wide range of ability is displayed by these, even tho all be low, and the condition of many seems to demand their instruction and care by special teachers in special groups. We now have in the state fifty towns where these special classes have been formed and the students so served probably number 2,500. (In a recent year when there were 42 towns employing 134 teachers the numbers were 1,484 boys and 711 girls, total 2,195.) The writer had opportunity to spend a little time in each of twenty-three of these departments and to discuss with the teachers the nature of the manipulative work carried on.

Both girls and boys are helped in busy work exercises, in addition to their academic courses, which develop muscular co-ordination and increase general interest in life and work. Later recognition is made of the more particular interests and needs of the sex groups. We find scissors and paste exercises and cardboard construction followed by work in reed, raffia, art fiber, and cane, and later by some work in pottery, weaving, and brush-making. Then comes the main division of offering where girls get work in cooking and sewing and where boys learn the elementary processes of bench woodwork and a few other industrial activities.

The larger number of specially prepared teachers conduct the complete training of their charges while a few enlist the help of some one in the industrial department of the school. The special rooms hold much of interest to those unacquainted with the work and the writer was greatly surprised at the methods employed and the varied and high character of the work accomplished. Some rooms were equipped with single sets of our commonest tools, and projects were being done by boys much as they are done in grade seven and below in manual training departments. Boys were found working on toys, bookracks, pedestals, tool boxes, bird houses, footstools, and the like. In two places a little cobbling

is attempted and in one some simple soldering. Work on baskets and brushes is common and the output compares favorably with what was seen in the classrooms of more advanced children. Many of the groups do weaving, by hand and at small looms, and produce a type of rug work that finds ready market in the community at continuous sale and on special open house occasions. One group had at the time of visit furnished sixty-three yards of excellent carpet to a fraternal organization of the town.

In a few places a separate room with equipment for woodwork has been provided and one of the special instructors takes charge of the boys here while another instructs the girls in special work of their own. One of these rooms contains nine single benches, each furnished with square, plane, hammer, mallet, chisel, saw, brace and bit, and gauge. Another room has more benches but depends upon general equipment. One teacher has requisitioned a small platen press and a font of type while another has asked for a small wood lathe.

There seems to be a growing desire on the part of the teachers to have the older boys taken from them for industrial instruction by men with more industrial training and in shops more fully equipped. In one town we found six or eight boys going to the high school shop for an hour and three quarters each day. In another several boys go for a full half day each week, and in others for one period each day through the year. Just here we see the connection of this work with that of the general field under survey in this study. Where the group of subnormal boys is sufficiently large to be handled in the shop as a special class the problem is new and difficult enough to cause the industrial teacher much embarrassment and self-criticism. He knows little of the type of pupils which he is now asked to instruct and he finds that his tried methods are often unavailing, that his best efforts are often unfruitful. If he were intelligent in this new field to the degree that he could profit by his experience he would look upon the situation as one full of interest and worthy of this study. On the contrary he is dissatisfied and fearful. Particularly trying is the condition in the smaller places where the few special boys are sent to the shop to be made a part of whatever class happens to be in session at their coming. In his eagerness to do some good, to make a showing, or to avoid mishap, the

instructor feels forced to slight the group of his greater responsibility.

Record is made here of a plan in operation at Crosby, under Miss Jacobs as special room head, which seems to have great merit. Industrial work for the majority of boys is carried on for an hour a week in a special shop but the larger boys are sent to the industrial department three days a week for single periods. There are then selected some half dozen who were made under-studies to certain small shop owners of the community—a printer, a tinner, a tailor, a garage man, and a shoe repairer. These open-minded citizens are encouraged by Miss Jacobs to accept the help of these boys in late afternoons and on Saturdays and to pay them such sums as may be due, the while teaching them safe processes and increasing their responsibilities.

The experiment proves gratifying in that the boys do so well that the employers consider their services worth while and apt to be permanent. This co-operative plan appears to be very well conceived in that it affords definite preparation for types of work of a rather individual character. It does not seem best to continue the weaving, brush-making, woodworking type of training up to the time of the student's leaving the system for his life work. Nor does it seem well advised to attempt to train him for an occupation of highly specialized character where there is little personal interest on the part of employer. While the boy is still under the special teacher's influence and subject to her guidance he may, as at Crosby, be gradually fitted into a niche where he will be self-supporting, understood, and socially adjusted.

But the purport of this discussion is that our industrial teacher is not prepared for this extra, very special duty, and that he should either be relieved of it or urged to take such additional training as will give him confidence and the means of success.

C. FARM SHOP WORK

With the introduction of vocational agriculture as a part of the regular high school offering or as a course for separate handling in short units for those not in school the full year, there has developed the need for a new type of shop instruction. Various titles are used throughout the country in announcing this

special work, all of which stress the call for a training through experience, projects, and jobs more closely applied to general farming than are our usual school shop assignments.

The farmer, with limited and mixed equipment, continually constructs and repairs as needs arise in the carrying through of the plan of upkeep and improvement conditioned upon his resources. With the increase of labor-saving machinery for work in the fields and about the barn and dwelling he and his sons feel increased need for manipulative skills and mechanical sense and resourcefulness. The coming of the auto and tractor, the stationary engine for pumping and grinding, the motor attachments to certain pieces of equipment, the special farm lighting plant, and the cutting and welding unit has meant more to him than a lessening of his labor. These have meant some added labor in touch with science fields and they have found him unprepared. He welcomes the service rendered by the schools through the farm shop course.

In twelve of the schools visited the writer saw the beginnings of organization for this new course. During the year there were, in the entire state, forty-seven communities supporting Smith-Hughes agricultural courses, of which the shop work is a part, so that the twelve situations observed may be said fairly to sample this experiment.

The size of classes ranges from five to twenty-five boys and averages about fourteen. Students commonly receive two periods or eighty minutes of shop instruction each day for a six or nine month term. Some do their work in the regular industrial departments while in other places there has been fitted up a shop with equipment of a little different kind and arrangement, to constitute a working environment more nearly paralleling the farm home provision. This latter plan seems the more appropriate one because of its probably continuous influence upon the selection of course materials. The equipment in two schools is here detailed. At Lamberton—three forges with accessories; two soldering outfits; two long benches with ironwork vise, pipe vise, tap and die set, plumbers wrenches, and carborundum grinder; a floor grindstone; small tools of mixed type; gas engine space. At Sleepy Eye—a forge and two anvils; long bench with

iron vise, metal cutter, and soldering kit; a cabinet for sheet-metal tools; another for the harness repair outfit; electric wiring board and kit; foot power grinder and grindstone; gas engine space.

The types of work engaged in divide themselves rather clearly into *construction* and *repair*. There can be given here no complete list of these jobs but enough of each to indicate the most frequent ones. (The order is not significant.)

Construction—Wagon jacks, tool boxes, neck yokes, sewing horses, poultry feeders, troughs, coops, loaders, wagon boxes, hog racks, corn racks, shoveling boards, and brooders.

Repair—New handles in tools, gas engine overhaul, grinding of edged tools, repair of machinery parts, glazing, saw filing, harness-mending, rope work, belt-lacing, etc.

Miscellaneous jobs—In sheet metal construction and simple soldering, in elementary wiring, in corner post setting, in key-fitting, in concrete work, and in the forging of chisels, punches, and door hooks.

Inquiry was made of both industrial teachers and instructors of agriculture as to which group of men, generally, are better prepared to conduct this new work. The men trained in the science of agriculture are better able to plan the course and the industrial men better prepared to conduct the classes. Both groups have distinct contributions to make, equally necessary to its success. Co-operation between the two may be assumed but either the one or the other must have the responsibilities of instruction. We feel that the actual teaching may well become ultimately the province of industrial teachers and the course a component part of the work of their departments. Industrial teachers will be more certain to acquire a knowledge of what should be taught than the agricultural man will be to attain proficiency in the shop skills and methods required. These conclusions point to a new problem in industrial teacher preparation.

There is an increasing literature on farm shopwork. Half a dozen textbooks have appeared in as many years and the results of several studies are now available. The work of Armstrong¹

¹ FRED EUGENE ARMSTRONG and FRANK WALDO LATIROP. Farm repair and construction work. University of Minnesota, College of Education, *Educational Monograph* No. 4, December, 1923.

and Lathrop has most significance for Minnesota. This report is divided into three general parts—what repair and construction operations are performed by farmers as a part of their regular farm work; what repair and construction operations are left to carpenters, masons, etc., hired especially for the purpose; and what tools are found on farms. Extensive tables are shown and a bibliography provided. Those interested in this subject will be benefited also by conference with Mr. Paul Calrow, state supervisor of agricultural education, and with Mr. A. M. Field, assistant professor of agricultural education, University of Minnesota, who served in preparing for the state department a syllabus in high school agriculture.

Observations were made in this field and this part of our report was written to emphasize the broadening responsibility of industrial teachers and the consequent changing functions of the teacher-training centers. If our conclusions are sound, the Department of Trade and Industrial Education in the College of Education should make available for its students a course in the teaching of farm shop work. Such work has been for some time in progress in the department of agriculture but the work has not to the present been recommended to those preparing for industrial teaching.

D. ART CORRELATION

Not much difference was apparent between departments as to the ways in which the elements of art are made a part of the general instruction in shop subjects. Naturally, more attention to the matter is paid in the case of bench wood work and cabinet-making than in other fields because these subjects are older, training institutions have stressed the art relations, and other subjects do not lend themselves so easily to the correlation. One general suggestion will be made here. We are inclined to have individual students, with their varying art abilities, design projects to give good line, balance, and simplicity. By reason of the instructor's guidance the results are usually pleasing but the benefits to each pupil are meager and the knowledge gained probably not consciously assimilated and organized. Can we not improve the condition by more group work on art principles as

applied in the work of individual students? Would it not be better for all boys to submit designs for criticism, even roughly at the blackboard or on paper, from which the teacher might develop with the group the one or two designs worthy of execution? It seems that this procedure would give better design and greater average training in art.

The supervisors of art, where there are such, commonly are responsible also for music and the two subjects combine to use what time and energy they have. Instances where these specialists set up definite points of contact with industrial classes are rare. There is, however, a not inconsiderable amount of this related art work being done, so that we can give notes here on attempts in certain of the towns visited. At Faribault we find a course for boys in vocational sketching which gives much opportunity. At Winona eighth grade boys and girls are separated in art classes so that there may be a different emphasis with each group. At Mankato seventh grade boys and girls together experience eighteen weeks, one hour a week, of lecture and demonstration work. This is the nearest approach observed to what is being done more formally and extensively in two other cities—Virginia and St. Cloud. The situations in these places deserve more detailed presentation.

At Virginia elective courses in what we may term “pure art” are given by Mr. S. Trybort to six groups. In addition to this there is the work of Mr. R. Fromm who meets classes in related art, instructing about two hundred fifty boys each week. All phases are presented but there is particular emphasis given to lettering, object drawing, design, and color as these may touch industrial and commercial occupations. One hour each week is given to work that is largely manipulative and which is related to the eight male occupations represented in the school curriculum. Class grouping is maintained for correlation with office practice, electricity, forging, turning, printing, drawing, cabinet-making, and agriculture.

At St. Cloud, Mr. Robert S. Hilpert has organized the related art work upon the plan of little or no manipulation. He depends upon lectures, class discussion, assigned readings, illustrative materials, and class trips to bring to all students *results in appreciation* as worth while as manipulation may bring to the few who

have marked artistic capacities. It is a lecture and laboratory method answered by a most encouraging display of group and individual interest. Boys come in separate groups represented in the six shop experiences of the general industrial course—woodwork, printing, electricity, auto mechanics, drawing, and metal work. Principles are developed and applications made to the one field at a time. (Each boy eventually gets six weeks of each of six experiences and therefore art applications in six fields.) As indicative of the conceptions sought to be given we cite one—that *serviceableness and beauty develop together*, as evidenced by improved machinery, house-planning, electric lighting, and automobile manufacture. It is a consumer's course in art appreciation and judgment for all students and is strongly recommended.

Bennett² has recently made a contribution to the literature of art education. In this very readable monograph we find three scattered statements which give us touch with the author's views and which should motivate the reading of the whole.

There are two main reasons for education in art. The first is to increase the number of appreciators of art and art products; the second is to multiply the number of artists or workers who are skilled in art processes. . . . Appreciation of art is not the same as knowledge of art. The essence of art appreciation is not primarily a matter of the intellect, but of the emotions. . . . Until a man experiences some of the technical difficulties in producing desired effects he cannot really appreciate the work of the master who has produced those effects with apparent ease.

E. OCCUPATIONAL INFORMATION AND GUIDANCE

Teachers and school administrators have long felt responsibility for the proper advising of youth regarding occupational choices, but there is perhaps no other function of the schools which has been slower in development and which has cost more of extreme effort on the part of pioneers.

Nation-wide interest in the matter was assured in 1918 by the issuance of two bulletins by the United States Bureau of Education, Bulletins 19³ and 24.⁴ The first defined guidance, summar-

² CHARLES ALPHEUS BENNETT. *Art training for life and for industry*. Peoria, Illinois: Manual Arts Press. 1923. 61 pages.

³ Report of the Committee on the Reorganization of Secondary Education, appointed by the N. E. A. Vocational Guidance in Secondary Education. *Bureau of Education Bulletin* No. 19. 1918.

⁴ W. CARSON RYAN. Vocational Guidance and the public schools. *Bureau of Education Bulletin* No. 24. 1918.

ized the scattered attempts, and made recommendation of a program. The definition, page 9, follows: "Vocational guidance should be a continuous process designed to help the individual to choose, to plan his preparation for, to enter upon, and to make progress in an occupation." The program recommended, briefed on page 16 and detailed following, is treated under eight heads as follows: 1. Survey of the world's work; 2. studying and testing pupils' possibilities; 3. guidance and rechoice of vocations; 4. guidance with reference to preparation for vocations; 5. guidance in entering upon work, that is, placement; 6. guidance in employment, that is, employment supervision; 7. progressive modification of school practices; and 8. progressive modification of economic conditions. On pages 17 and 18 we find an "Outline for the Study of an Occupation." Mr. Carson's bulletin defines the field, gives the history of the movement, reports studies, suggests materials and the methods of their use in schools, and deals with organization in typical centers. An excellent bibliography—extensive, classified, and partially annotated—covers pages 102 to 131. A more recent publication of the bureau prepared by Bawden⁵ should be named here for its suggestive values. Pages 10 and 11 show a form used to study an occupation, pages 21 to 23 a report by Mr. A. H. Edgerton on activities in Detroit, and pages 32 to 34 a reference list.

Most gratifying acknowledgment of the field and assistance in its development have been given recently by the National Society for the Study of Education. Part II of the 1924 Yearbook⁶ of this society, prepared by Professor Edgerton and edited by Dr. Guy M. Whipple, deals specifically and fully with the problem. (Part I, also an extensive volume, is entitled, the Education of Gifted Children.) We have here, grouped conveniently, facts on the present status of guidance, the programs of certain

⁵ WILLIAM T. BAWDEN. Studies about occupations in public schools. (Report of a conference of specialties in Industrial Education held at Detroit, November 29, 1922.) Bureau of Education. Washington. *Industrial Educational Circular* No. 16, March 1923.

⁶ Twenty-third Yearbook of the National Society for the Study of Education. Part II. Vocational Guidance and Vocational Education for the Industries. Bloomington, Illinois: Public School Publishing Company. 1924. 456 pages.

large and of small cities, plans for gathering and using occupational information, activities in colleges and universities, presentations on related objective measurement and preparation for counseling, and a selected bibliography. The second section covers in the same complete and careful way the closely allied subject of "Vocational Education for the Industries."

Attention is called to the *Vocational Guidance Magazine*, official organ of the National Vocational Guidance Association, Frederick J. Allen, Harvard University, editor. The work of the association deserves the support of all school people and the magazine should be provided for every high school of the state. A detailed statement⁷ of the principles of guidance was made by this society at their Atlantic City meeting in 1921.

The development in Minnesota is not unlike that characteristic of the country at large. Of the sixty-five schools visited many were found to be giving some attention to guidance in English, civics, and social science classes. The results of such attempts must be meager because of limited time, non-preparation of instructors, and the common attitude of pupils toward what is presented incidentally. Seven schools make a practice of inviting people of the community each year to give in assembly, talks which form a series on occupational choice. This plan is open to several adverse criticisms. The persons selected to speak are commonly not representative of the professions or trades, in which they engage; they are those of marked success or who possess personal qualities and abilities in speech not evenly distributed among their fellows; they are prone also to discuss topics of close interest to them and to lose sight of the purpose for which they were invited. Almost invariably they omit the bad points that young people should know about an occupation and leave students with a too alluring conception of their own possibilities in the fields in question. At one city outside speakers are furnished at the time of invitation with an outline for their guidance in discussing their experiences.

Some schools depend upon "home room teachers" or special advisers, selected for school years or for smaller groups, to give a type of personal counsel. Usually the groups are large, the teachers prepared only within a narrow range of occupations, and

⁷ HELEN T. WOOLLEY and ANNE S. DAVIS. The principles of vocational guidance. *Chicago Schools Journal* 3:298-302. June 1921.

apt to give most assistance to those who seek the most. The plan of individual advisement should be productive of excellent results in the later periods of school attendance but it does not quicken an entire student body to see the need for broad study of the problem.

Departure from these practices in the direction of more formal and definite advisement for all students has begun to be made in Minnesota schools. Three towns visited provide specific units of instruction in occupations, usually in the upper grades, on schedule and under compulsion. At Faribault, for example, "The Study of Occupations" is made one of the several experiences to which all students are subjected. Class meetings are as numerous and as regular as those in other subjects. Materials and methods are being developed as for other subjects. The greatest claim for this plan as contrasted with incidental work is that there is consciousness of the importance of proper choice and the subject gains prestige and motivation. There is interest and open-mindedness as well as plenty of time to give worth-while facts and conceptions.

An excellent plan is being carried out at St. Cloud which has been explained fully elsewhere by Mr. John F. Friese,⁸ director of industrial education and guidance. In brief it is that all of the high school teachers are asked to prepare one or more occupational talks following an outline previously determined. Printed materials, conferences, visits to plants and business houses, and questionnaire findings are used in preparation for these talks. About 150 lectures are scheduled through a year and the list is posted for examination by students. Freshmen must hear eighteen lectures and other classmen varying numbers but as to which ones there is free election. Thus the individual tendencies are found and made the basis for later counsel. Lecturers merely keep their appointments, cover the outline for those present, and open the meeting for discussion to the end of the period. Roll is taken and passed to the business office for filing on individual records so that it may be known what lectures (by number) are

⁸ JOHN F. FRIESE. Educational and vocational guidance in the technical high school. Twenty-third Yearbook National Society for the Study of Education. Bloomington, Illinois: Public School Publishing Company. 1924. Pages 114-18.

heard by each pupil. This scheme has to commend it completeness of data and good organization and the more important element of committing pupils, teachers, and parents to a constant study of personal futures.

Space can not be used to list the many helpful publications in this field. The two of first importance for Minnesota are here mentioned. Miss McAlmon,⁹ counselor, Minneapolis Department of Attendance and Research, has prepared for the public schools a most valuable pamphlet used for one month in the course named in the title. The chapter headings will reveal its usefulness for all Minnesota schools: 1. Why Work and Why Go to School; 2. The Need of Training; 3. The Ways in Which People Earn a Living in the United States; 4. Principal Occupations in Minnesota; 5. Principal Occupations in Minneapolis; 6. Reasonable and Unreasonable Choices; 7. The Analysis of an Occupation; 8. Bibliography, and an Appendix Showing U. S. Census Analysis, Minnesota Laws on Employment, and State and City Statistics.

The best text now available for classwork in occupational study is the revised edition of Gowin and Wheatley¹⁰ which has been prepared for both girls and boys. The materials are representative and well organized and there is much good quotation and reference detail.

As to the need for occupational study and formal guidance and counsel there is probably little doubt. Our casual observations convince us but the need is confirmed by studies recently reported, a few of which will be named. Proctor¹¹ shows that 91.2 per cent of 930 choices of high school pupils in eight cities fall within the white collar class. "The vocational opportunities, as shown by the U. S. Census Reports, are just about the reverse of the distribution of high school pupils' choices. Altho it is a fact that the high school represents a rather highly selected group of young people from whose ranks the clerical, business, and professional occupations are very largely recruited, it is apparent that by no means all of the 91.2 per cent will find their way into

⁹ VICTORIA McALMON. A study in occupations for classes in community life problems. Minneapolis: Board of Education. 1924. 43 pages.

¹⁰ GOWIN and WHEATLEY. Occupations. (Revised by John M. Brewer.) New York: Ginn and Company. 1923. 441 pages.

¹¹ W. M. PROCTOR. The use of psychological tests in the vocational guidance of high school pupils. *Journal of Educational Research*. 2:533-40. September, 1923.

these occupational fields. Furthermore, for their own best good and the best good of the nation, a great many of them should be directed toward the agricultural, mechanical, and industrial fields." We can now discover quite accurately the intelligence levels of pupils and much progress is being made in determination of the levels demanded by various occupations so that we shall ultimately bring these two factors into working relation. Vocational psychology, in so far as we have such a science is now doing more for the protection of employers when selecting payroll people than for the more worthy purpose of helping the schools in guidance. (This science must, of course, consider many factors other than intelligence.) Schmidt¹² gives extensive data on 8120 pupils in 48 Wisconsin high schools, boys and girls, and concludes that: (a) there is no character-of-community influence except in the case of farming; (b) there is no relation between choosing an occupation and the numbers needed by state or nation; and vocational trends appear to persist in a marked degree. Alberty¹³ provided facts of the same nature on 3000 boys and girls in the Cayahoga County schools and Lewis¹⁴ in 1915 on eight hundred Iowa boys. Miss Merrill gives data on 596 eighth grade children, in 21 schools of the less prosperous districts of Chicago, as to their plans on completing the grades. She finds 71.6 per cent of the total (72 per cent girls and 71 per cent boys) planning to attend high school and shows the choices made among the special sections or "courses" of the program. Thorndike and Symonds¹⁵ compared the occupations of high school graduates and non-graduates and showed a regular placement on levels of work by those respectively who had graduated, those who had not graduated, and those who had never attended. Powers¹⁶ showed for 850 students of one Arkansas high school that "Students possessing superior intelligence are attracted to those subjects which

¹² HANS W. SCHMIDT. A brief investigation of vocational trends among high school students in Wisconsin. *Industrial Arts Magazine* 12:215-22. June, 1923.

¹³ H. B. ALBERTY. The vocational interests of children. *Ibid.*, 12:255-60. July, 1923.

¹⁴ ERVIN E. LEWIS. Work, wages, and schooling of eight hundred Iowa boys in relation to the problems of vocational guidance. University of Iowa, *Extension Bulletin* No. 9.

¹⁵ E. L. THORNDIKE and P. M. SYMONDS. The occupations of high school graduates and non-graduates. *School Review* 30:443-51. June, 1922.

¹⁶ S. R. POWERS. Intelligence as a factor in the election of high school subjects. *Ibid.*, 30:452-55. June, 1922.

make the largest intellectual demands, while students of inferior intelligence are attracted to those subjects which make larger demands on manual dexterity and lesser demands on intellectual capacity." These reports are probably sufficient to greatly strengthen our belief that organized schemes for the guidance of all students must be devised and that our efforts are as necessary for educational as for occupational counsel. Favorable entrance upon and success in all vocations are so closely linked with the preparation for them that our school guidance activities must far exceed the mere detailing of what certain life jobs mean.

This section of our report was not intended to be a general discussion of our topic but was meant to show the place in the movement properly to be taken by industrial teachers. There seem to be prevalent in the schools visited two conceptions which are narrow and which persons interested in industrial education wish to correct or change. *First*, "Vocational guidance" means to many people guidance in the field of industry. *Vocational* is an all inclusive term while *industrial* is a limited one, an industrial school or class being only one new type of institution for vocational preparation. By reason of the misconception the industrial teacher is often appealed to first of all to plan and even to administer the guidance work done in a system. We have at least two outstanding cases of their success, Mr. J. F. Friese at St. Cloud and Mr. L. H. Lehman at Red Wing, but I think we will all agree that usually the industrial teacher without special interest or preparation in the subject will probably narrow for the teachers and townspeople the meaning of the term and the extent of the service. The industrial teacher can be of great assistance but if he is to lead in the work, i.e., determine its policies and perfect its means, he must be specially prepared. The training institution must see to it that he has contact with guidance materials to an extent not now experienced.

Second, superintendents and principals point with just pride to their equipments and classwork in the fields of industry, agriculture, and home management. For the junior high school particularly they lay claim to much worth-while guidance through shop activities. We feel that their assumptions must be true, but we have as yet little or no scientific proof that the shops influence the choices of students. In fact many people are skeptical

about these experiences being of great value for choice altho they acknowledge their worth for preliminary training and for other ends. Let us not be so blinded by the glamour and stir of these departments as to neglect the presentation of facts about and conditions of work in the dozens of other industries which cannot be represented in the school curriculum and the hundreds of occupations lying wholly without the type or range of industrial employments. "Try-out courses" (I wish we had a better term) alone do not constitute guidance. Lectures by industrial teachers within the fields of their schedules and not concerning other fields or concerning industrial employment as a whole are the means of but limited guidance. Plans for helping students to determine in which industrial pursuit they will engage rather than whether they will enter industry at all is unwise guidance if not coercion.

We need an organized plan of presentation and counsel for all students about all classes of occupations, and in these plans the industrial shops and teachers will perform their very important part. As factors in any scheme we must have perfected personal records, a study of the educational and earning opportunities of the community, details of conditions within numerous fields of employment, and a means for following students after they have left the schools. In the large cities all of these things will continue to be handled by those who administer and supervise the industrial phases of the curriculum. In the small places varied attempts will be made, perhaps none better than the scheduled class in *occupations*, but all with the one great purpose to give breadth and personal meaning to the social and vocational outlook of youth. No small measure of the present social conflict is attributable to improper selection of employment occasioned by the lack of guidance.

F. SUMMARY AND CONCLUSIONS

(Numbered consecutively throughout the study. For earlier numbers see pages 26, 54, 73, and 94.)

51. Normal training classes in the high schools (now 100 in the state) commonly pursue industrial shop work for a very limited part of their year in training for rural teaching positions. The two prominent objectives of this brief experience are (1) to extend the girls' knowledges and appreciations in a new direction and to give them a certain resourcefulness in planning and executing manipulative projects; and (2) to give them preparation for passing on to their students, in semiformal and incidental ways,

the information and skill acquired. Our industrial men are quite at a loss to know what to do for the girls in so few hours as they have them, although they acknowledge interest in the plan and belief that it may produce desirable results. There should be prepared a statement of aims and a suggestive course outline for the guidance of teachers. If the work with the girls is worthy to be continued and encouraged it constitutes a problem in teaching fitness that must not be ignored by the training centers.

52. Special classes for subnormal children are maintained in 50 Minnesota towns and approximately 2500 children are now receiving a definite type of instruction under teachers with special training. To complement the hand exercises done in the rooms, older boys are sent regularly to the industrial department. They are scattered through the day, joining whatever classes are in session, or are sent in special groups. In a few places a special workroom for this class has been provided. The industrial teacher has not been a student of this type of children and finds his methods unavailing and his efforts largely unfruitful. He should not ask to be relieved, but the training institution finds again in this connection a new and definite responsibility. (The text should be read for detail of a plan of training and placement in operation at Crosby-Ironton.)

53. A new course in farm shop work has recently been made a part of the materials of secondary school agriculture and of the more intensive vocational courses. Construction and repair, based on farm requirements, are taught in the regularly equipped industrial departments or in separate shops of rougher and more mixed equipment. Teaching is now done by the agriculture teachers in some schools and by the industrial teacher in others. Both of these people have a distinct contribution to make to the success of the work and the question of primary responsibility is before us. The writer feels that the actual teaching of farm shop work should be made a part of the work of the industrial departments. Here, again, we locate a new phase of industrial teacher preparation.

54. Training institutions have always stressed the presentation of art principles as part of the material of industrial instruction. Until recently and to a large extent at present the correlation has been made incidentally and in rather individual fashion. Now we find a very commendable tendency to do group work in art appreciation and particularly in the field of related art. We are beginning to make art applications differently for sex groups and, in the case of boys, for occupational groups. (See text for detail of Virginia and St. Cloud plans.) This means that art must receive greater emphasis in training curricula and that presentation must be made more and more in the light of proposed group and scheduled instruction. It means research in related art and the organization of many related courses as distinct units.

55. Vocational guidance in most schools of Minnesota is now in the first stage of interest, and some good work is being done incidentally, through subjects such as English and civics and by the use of outside

speakers in assembly. Some few schools offer scheduled courses in *occupations* and some have devised rather ingenious schemes for individual counsel. The writer believes that scheduled class work with a text, followed by personal counsel is the best advised plan for our towns because it makes for consciousness of the need for constant consideration of personal futures.

56. There seems need to emphasize that "*guidance*" means educational as well as vocational guidance; that "*vocational guidance*" does not mean guidance for the industries alone; that the provision of equipment and instruction in a few fields does not constitute a guidance program; and that the industrial teacher is not necessarily the person to be selected for leadership in this movement. We need an organized plan of presentation and counsel for all students about all classes of occupations, and as factors in the plan we need perfected personal records, a study of educational and earning opportunities of the community, details of conditions within numerous fields of employment, and a means of following students after they leave school.

57. With each, then, of the five new and special activities covered in this chapter—normal training, subnormal classes, farm shop work, related art, and occupational guidance—the industrial department is in some measure concerned. The points of contact have been studied for their influence upon the determination of responsibilities in teacher training.

CHAPTER VI

OUR OBJECTIVES AND THE MEANS OF THEIR ATTAINMENT

A. THE COMMON "CLAIMS" FOR INDUSTRIAL COURSE WORK

Acquaintance with the literature of industrial education through a dozen years has perhaps equipped the writer to state rather exactly the conditions regarding the treatment of objectives in our professional readings. He feels that at least two of his conclusions need no proof. *First*, that until the recent rapid extension of the junior high school as a special administrative unit, and with the exception of brief editorials in our special journals, there has been little of definite listing of aims or objectives. What we have had in mind as sufficient justification for our offering has commonly been buried in discussions of course outlines, equipment, and methods. We have left our real desires to be interpreted by implication. At present our special literature and many publications of more general circulation abound in rather concise statements of our purposes. *Second*, that until recently, also, we have written of *claims* rather than aims. We have said what industrial work accomplishes or has accomplished rather than what we are attempting by a given procedure to accomplish. Probably the fact that our early leaders took a largely defensive position accounts for this method of presentation. The truth remains that the writing was long done in an after-the-fact manner and that it is now being done in a manner wholly different. We now preface our course outlines, our discussions of method, and our programs with definite statements of the ends in view. Thus are we guided and checked in our attempts to attain these ends. We do not longer "make out a case" for industrial course work and leave it for rough handling by the unfriendly. We state the aims clearly so that all may work with us for their realization.

In a recent summer session a class of twenty-four industrial teachers of varied training and teaching experience attempted to compile from our literature a frequency list of the aims that

had been expressed. Each man read, after a plan had been determined by class discussion, half a dozen assigned articles, book chapters, or editorials. We found definite statements infrequent and implied aims exceedingly difficult to handle in classification. Many are named here for the past and present interests which they record—

sense training and muscular control, contrast to other school work, satisfy the natural desires of boys, encourage habit of observation and inquiry, help in selection of a life work, handwork a tool like language, better citizenship, acquaintance with shop practices, discover special abilities, keep boys in school, man's influence during adolescence, responsibility for a task, concentration, develop mental activity, dignity of labor, interpret plans and drawings, science facts and principles, physical exercise, home upkeep, interpret environment, develop technical skill, preliminary training, unselfish spirit, art principles, test thinking by action, avocation, know good construction, manual dexterity or handiness, train constructive imagination, accuracy, intelligent selection of manufactured products, complete a useful or ornamental object for the home, and so on seemingly without limit.

The amount of class time necessary to the carrying out of this project was well spent, altho we were not provided at the close with a list of aims upon which any great number of writers had agreed. Trends and a tendency toward unity of purpose in certain directions had been noted and all who had participated felt that we must select a few aims, not too general, and concentrate attention upon them.

The writer next prepared for his own examination a list of references which by their titles would deal quite exclusively with objectives and which would provide the opinions of many men whose names are most familiar to those interested in general industrial training. He confined the list also to writings of the past five years and largely to our three special journals. To the members of the editorial staffs of these journals, whose names do not all appear in the selected list, credit is due more than to others for the advancement that we have made.

The bibliography was finally much reduced because of misleading titles and indefinite statements, so that we have named

in our footnotes (1-29) the readings that were actually searched in the hope for greater unity and a later viewpoint. It was the intention of the writer to use the limited set of aims resulting from this canvass as part of his visitation inquiry. It was thought that we would profit by a comparison of the judgments of administrators and industrial teachers as to the attainment of these objectives. In examination of the references we had often again to resort to our own translation into a supposed listing of aims, but throughout, there was much more of definiteness in these selected discussions. They presented almost nothing that had not been previously located but gave evidence of a changed

¹ WILLIAM T. BAWDEN, Manual training ideals are basic character ideals. *Manual Training Magazine* 23:364-65. April, 1923.

² CHARLES A. BENNETT, The cultural and industrial value of handwork. *Ibid.*, 23:366-67. April, 1923.

³ FRANKLIN BOBBITT, The curriculum (Pt. II. Ch. 7, 10. Social Aspects of occupational training. Purposes of vocational training.) New York: Houghton Mifflin Co. 1918.

⁴ FRANKLIN BOBBITT, Curriculum making in Los Angeles. Supplementary Educational Monograph No. 20, Ch. 12. Chicago: University of Chicago Press. June, 1922.

⁵ FRED G. BONSER, The new status of practical arts in the problem of education. *T. C. Record* 21:238-45. 1920.

⁶ JOHN BREWER, The need for try-out courses in the junior high school. *Industrial Arts Magazine* 11:85-88. March, 1922.

⁷ HOWARD L. BRIGGS, Seven different objectives in manual arts. *Ibid.*, 13:173-75. May, 1924.

⁸ KENNETH V. CARMAN, Results of an inquiry concerning certain phases of junior high school industrial arts. *Ibid.*, 11:251, 273. July and October, 1922.

⁹ W. W. CHARTERS, Curriculum construction. (Ch. 21, Vocational Courses.) New York: The Macmillan Co. 1923.

¹⁰ DANA Z. ECKERT, The vocational and educational guidance program of the junior high school. *Industrial Arts Magazine* 11:291-94. August, 1922.

¹¹ A. H. EDGERTON, Industrial arts and prevocational education in our intermediate and junior high schools. *Ibid.*, 11:23-26, 45-51. January and February, 1922.

¹² A. H. EDGERTON, The present status of industrial arts education. *Manual Training Magazine* 23:335-43, 377-84, 413-21. April, May, June, 1922.

¹³ F. M. GROSHONG, Ten reasons for teaching manual training. *Industrial Arts Magazine* 11:277. July, 1922.

¹⁴ CHARLES A. KING, New visions and their fulfillment. *Manual Training Magazine* 22:311-15. April, 1921.

¹⁵ PAUL E. KLEIN, Industrial education in the upper grammar grades of a non-directly vocational school. *Industrial Arts Magazine* 8:337-40. September, 1920.

¹⁶ FRANK M. LEAVITT, Vocational education in its relation to the junior high school. *Industrial Education Magazine* 24:39-41. August, 1922.

¹⁷ ROBERT R. LEONARD, The superintendent's opportunity to co-ordinate general and vocational education. *Ibid.*, 25:271-74. April, 1924.

¹⁸ ARTHUR B. MAYS, Determining factors in the evolution of the industrial arts in America. *Industrial Arts Magazine* 13:43-47, 85-89. February and March, 1924.

¹⁹ D. J. MACDONALD, Trade and Industrial education and industrial arts—their respective aims, materials, and methods. *Ibid.*, 11:209-14. June, 1922.

²⁰ JAMES MCKINNEY, Manual arts in junior high school. *Industrial Education Magazine* 25:93-97. October, 1923.

emphasis. Some claims mentioned in the first references were noted to have been dropped in the second and some rarely mentioned in the first readings appeared frequently in the newer list. The *guidance function* and *vocational training* had gained particularly while *muscular control*, *concentration*, *hand and head together* and so on had lost as perceptibly. Difficult as it would have been, because of variety of expression, to obtain actual frequency of mention, the list was shortened by this process to what was usable for the purpose intended. Those objectives named following were of most frequent occurrence in the writings of these men. The statements used are by the writer and the order is not significant. Phrases in parentheses are for the clearer interpretation of the shorter items of the list.

1. To develop some degree of skill in the use of common tools.
(Usable skills that all should possess—unspecialized tasks—home upkeep.)
2. To afford information and experiences that assure a broader view of the industrial world and make for social adaptiveness.
(Energize academic knowledge; think in terms of realities; interpret environment; habit of observation and inquiry; principles of related science, mathematics, etc.; social and economic problems; value and dignity of labor.)
3. To sample industrial occupations.
(Acquaintance with common shop practices; knowledge of manual activities; comparative view of type employments.)

²¹ JAMES MCKINNEY, The what and why of manual training. *Industrial Arts Magazine* 8:293-97. August, 1919.

²² C. G. SHARKEY, A co-operative plan for vocational instruction in the high school. *Vocational Education Magazine* 2:218-19. November, 1923.

²³ DAVID SNEDDEN, Practical arts in general education. *T. C. Record* 17:15-13, 156-84. 1918.

²⁴ DAVID SNEDDEN, Co-ordinating general high school and vocational education. *Vocational Education Magazine* 1:333-35. January, 1923.

²⁵ DAVID SNEDDEN, Sociological determination of objectives in education. (Ch. 13, *The Social Objectives of Vocational Education*.) Philadelphia: Lippincott Co. 1921.

²⁶ WILLIAM E. STARK, What are manual training teachers trying to do? *Journal of Education Method* 2:414-20. June, 1923.

²⁷ JAMES A. STARKWEATHER, A program of industrial education for junior and senior high school. *Vocational Education Magazine* 451-52. February, 1923.

²⁸ L. L. WINSLOW, A constructive plan for the organization of junior high school courses in industrial arts for boys. *Industrial Arts Magazine* 10:243-47. July, 1921.

²⁹ ROBERT WOELLNER, Industrial arts instruction as a factor in general education. *Industrial Education Magazine* 25:121-22. November, 1923.

NOTE.—Attention was given also to materials provided in mimeographed form at a recent teacher-training conference by D. M. Schweickhard, A. C. Newell, George B. Cox, and William E. Roberts.

4. To give a general preliminary training.
(Carry over—any trade made easier by knowledge of common skills; something to offer an employer in the way of preparation; start made if vocational school course is pursued later.)
5. To provide specific training for industrial employment.
(Vocational training; technical knowledge and skills; make entrance and promotion in industry easier; school apprenticeship; co-operative plan.)
6. To foster appreciation of good materials and workmanship useful at times of purchase.
(Know good standards of construction; discriminating selection of manufactured products; intelligent consumption; dislike of things careless, faulty, and incomplete.)
7. To discover special interests and aptitudes.
(Help in selection of a life work; like or dislike of manipulative work.)
8. To keep boys in school longer.
(Contrast with more formal subjects; practical training appeal to boys and parents; diversion; feeling of accomplishment for those unused to success in academic branches.)
9. To develop reasoning power.
(Sense training; test thinking by immediate action; independence of action; hand and mind together.)
10. To lead to a worth while use of leisure time.
(Hobbies developed; handiness in home upkeep; interest in reading about inventions and processes.)
11. To develop these personal traits:
Habit of industry; responsibility for a task; resourcefulness; ideals of service; effective group participation; orderliness; accuracy; sense of the value of time; proper attitude toward criticism.

We pass now to consideration of what those most closely concerned think about the probable attainment of each objective named. We have no measure of the judgments of the boys upon these items but we feel that they would check liberally and that in the absence of the suggestive list for checking they would offer nothing of importance.

B. COMPARATIVE JUDGMENTS OF ADMINISTRATORS AND INDUSTRIAL TEACHERS AS TO PROBABLE RESULTS

We have discussed the determination of the list of aims used in our study. This list, in the abbreviated form previously shown, (without the materials in parentheses and in the same order), was mimeographed and carried for use during the visits.

made at the various towns. Had it been the purpose to ask replies by mail the parenthetical notes would have been necessary and perhaps their welding into unit paragraphs would have been more appropriate. The check-sheet was either held in hand by the writer while he conferred with those interviewed or was gone over carefully with each before he began to do his own checking; that is, attempt was made to have each person who contributed well acquainted with the full significance of the brief statements of the list.

Each industrial teacher met (110 in all) and each superintendent and principal who was at the school during the time of visit (69 in all) passed judgment upon the objectives named by following the list provided. *Teachers were asked to consider the industrial departments as a whole rather than their individual courses. Administrators naturally thought of the work in its entirety. All were asked to think of what had been or was being accomplished under their special conditions rather than what might be accomplished in larger places or under more ideal conditions. The replies are therefore based to a considerable degree upon the limited offerings of the smaller places because the small towns are in the majority. The larger schools where offerings are somewhat broader each have several teachers so they tend to even the results by more votes in the checking.*

The results are as follows, the first column of figures being the checkings of the 69 administrators equated to the base 110 for comparison with the 110 judgments of the industrial teachers shown in the second column.

Several points are brought out in our table, perhaps none more interesting than the fact that there is no one aim or purpose of the work upon which all are agreed. The two items of highest total frequency are numbers 1 and 11(g) *skill in the use of common tools* (upon which all administrators agree) and *accuracy*. Expressed in terms of total checkings the teachers are more liberal than the administrators as shown by the figures 1245 and 1500—more liberal to the extent of 255 votes or 20 per cent. As to the items of *general benefit*, items 1 to 10 inclusive, we find teachers more liberal by 16 per cent, and on the *personal traits* 11(a) to 11(i) by 24 per cent. Thus, differences do exist

and in sufficient amount to force the question whether we can hope for greatest return until these two groups are brought to closer understanding. We would expect teachers by their immediate contact to be more conscious of benefits accruing from the course work, but we would place greater reliance in the judgments of administrators who have a purview born of constant evaluation of all courses in terms of the aims of the school as a whole.

TABLE XXII

JUDGMENTS BY SCHOOL ADMINISTRATORS AND INDUSTRIAL TEACHERS IN 65 MINNESOTA CITIES AS TO THE OBJECTIVES ATTAINED BY INDUSTRIAL COURSES IN THEIR INDIVIDUAL SYSTEMS

	Administrators		Teachers	
I. Skill in the use of common tools.....	110		107	
2. Information and experiences that assure a broader view of the industrial world, social adaptiveness	30		57	
3. Sampling of industrial occupations.....	37		60	
4. General preliminary training.....	80		90	
5. Specific training for industrial employment....	11		22	
6. Appreciation of good materials and workman- ship, useful at times of purchase.....	98		94	
7. Special interests and aptitudes, general guid- ance	72		89	
8. Keep boys in school longer.....	78		74	
9. Reasoning power	70		91	
10. Worth while use of leisure time.....	48		55	
Totals	634		739	
II. Personal traits:				
a. Habit of industry.....	85	89		
b. Responsibility for a task.....	96	102		
c. Resourcefulness	80	87		
d. Ideals of service.....	40	61		
e. Effective group participation.....	32	55		
f. Orderliness	83	91		
g. Accuracy	101	105		
h. Sense of the value of time and materials	43	81		
i. Proper attitude toward criticism...	51	90		
Totals	611	761		
			611	761
Grand Totals			1245	1500

Neither group assigned much credit to aim number 5—*Specific training for industrial employment* and we feel that those who did check this aim as being attained were thinking in terms of a particular course or a special group rather than of the entire departmental activity. The greatest differences between judgments of the two groups are found on items 2, 3, 11(e), 11(h), and 11(i). Expressed in gain or loss per cent of teachers' checks based upon the checks of administrators we have the following comparisons: *industrial intelligence*, plus 90 per cent; *sample industrial occupations*, plus 62 per cent; *effective group participation*, plus 71 per cent; *sense of value of time and materials*, plus 88 per cent; and *proper attitude toward criticism*, plus 76 per cent.

Figure 8 brings out a little more clearly than does our table two rather important considerations. First, that the *general benefits* of preparation in skills and knowledges and the *personal benefits* of development in attitudes and ideals are thoroly mixed in placement in the figure. Second, that these personal traits claim half the places in the lower half of the figure. Both teachers and administrators think of industrial subjects as being valuable quite as much, and even more, for the effecting of desirable personality and character changes as for the generally acknowledged purposes of manual dexterity and industrial appreciations.

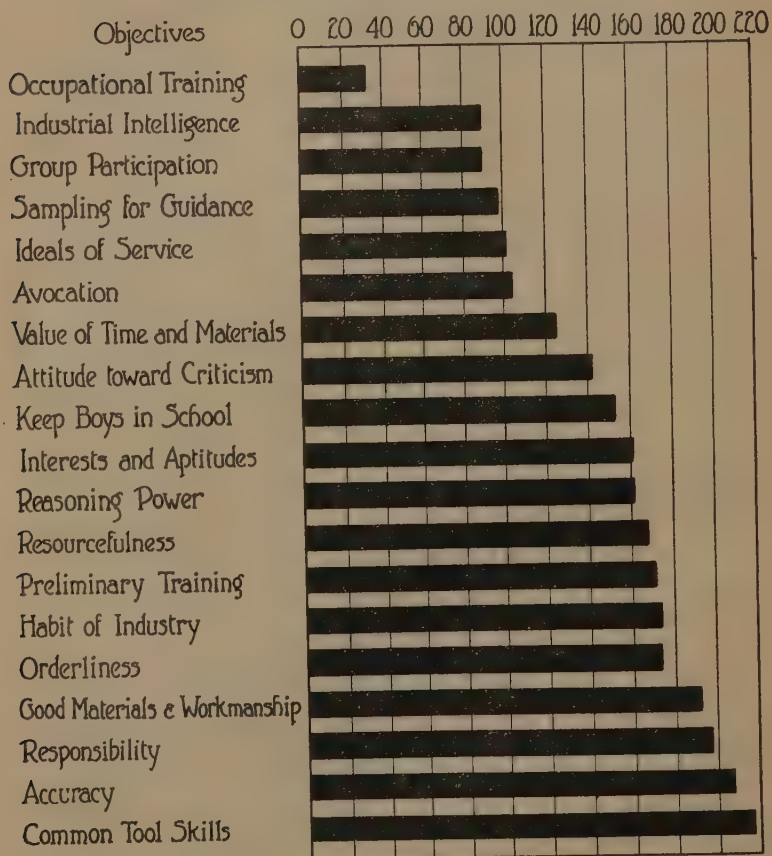
The writer is tempted to pause here to discuss each of these claims and the relative judgments upon them in the light of his own observations during visitation and of the data supplied in earlier chapters. It is thought more appropriate, however, to supply next a brief set of aims upon which to ask agreement and emphasis and then to make use of his observations and data to suggest the fullest possible attainment of these.

In passing it should be recorded that each person interviewed was asked to name, if there were such, any bad influences of the industrial work or department upon individuals or the school. Few of the 169 persons named any undesirable influences. Perhaps, a half dozen persons alluded in this connection to these special tendencies or problems:—"snap courses," "material waste," "loafing place," "work informal, disorder carries over to

other classes," "no outside preparation demanded," "neglect to do academic work while voluntarily putting in overtime in the shops."

FIGURE 8

OBJECTIVES MOST COMMONLY ATTAINED BY INDUSTRIAL COURSE-
WORK. COMBINED JUDGMENTS OF ADMINISTRATORS AND
INDUSTRIAL TEACHERS IN SIXTY-FIVE REP-
RESENTATIVE MINNESOTA TOWNS



Length of bars indicate combined votes, of administrators and teachers, for each objective, as having been attained.

C. PROPOSED OBJECTIVES AND CONTRIBUTING FACTORS

Sections A and B of the present chapter pointed out the necessity for a brief list of objectives upon which to ask agreement and concentration of effort. It is hoped that the statements which follow may be viewed as sufficiently inclusive and clear to warrant their being kept in mind in the planning and carry-out of programs in places of varying sizes.

SIX PROPOSED OBJECTIVES

1. To develop skill in the use of common tools.
(For more worthy home membership, avocational purposes, and general preliminary training.)
2. To afford industrial information and social intelligence.
(For a better understanding of materials and processes of manufacture, economic necessity and social usefulness of skillful labor, and conditions and problems of industrial employment.)
3. To foster appreciation of good materials and workmanship.
(For intelligent and discriminating selection of manufactured products for home and business consumption and proper valuation of substantial and beautiful constructions in environment.)
4. To further intelligent choices of life occupations.
(For wider knowledge of the requirements of industrial jobs and positions, for better understanding of individual abilities and capacities, and for consciousness of the desirability of these two success factors being considered together.)
5. To inculcate worthy personal traits and attitudes.
(For the building of habits of industry, initiative, resourcefulness, independence, exactness, economy, and co-operativeness.)
6. To provide a measure of specific occupational training.
(For advantageous entrance upon and progress in suitable lines of work, when conditions point to early assumption of the responsibilities of earning a living.)

Statements of purpose are always appropriately followed by suggestion of plans for their realization. There are here enumerated a series of factors or school and departmental conditions which modify effectiveness of attempts to realize the objectives which we hold. These determine in varying degree the attainment of our aims. Mere listing will be sufficient for the understanding by many of the connections which exist. For the fuller appreciation of relationships, however, subsequent statement will be made of how each individual purpose is promoted or thwarted by the conditions which exist or which may be arranged regarding each contributing factor.

MODIFYING FACTORS

1. The number and variety of courses or experiences.
2. The length of periods and the total time allotment.
3. The size of classes and the homogeneity of grouping.
4. The equipment and its physical arrangement.
5. The course materials and their organization.
6. The methods and the plans of class management.
7. The teacher's fitness and his schedule.

FIGURE 9

THE RELATIONSHIP BETWEEN THE OBJECTIVES OF INDUSTRIAL COURSEWORK AND CERTAIN MODIFYING DEPARTMENTAL FACTORS. (AFTER KOOS*)

Objectives of Industrial Coursework (See previous listing for closer definition)	Modifying Factors						
	Number and Variety of Shop Experiences	Periods and Total Time Allotment	Size of Classes and Homogeneity of Grouping	Equipment and Physical Arrangements	Course Materials and their Organization	Methods and Class Management	Teaching Fitness & Schedule
Skill in the Use of Common Tools							
Industrial Information and Social Intelligence							
Appreciation of Good Materials and Workmanship							
Sampling Occupations for Guidance							
Desirable Personal Traits and Attitudes							
Specific Industrial Training							

NOTE:—Heavy squares indicate very close relationship or influence; hatched squares, less influence.

* L. V. Koos. *The Junior High School*. Harcourt, Brace, and Howe, 1920. Figure 7, page 88. The Relationship between the Features of the Junior High School and the Performance of Its Functions.

D. INFLUENCE OF FACTORS AND MEANS TO ENDS

1. *The number and variety of courses or experiences.*—As to what shop courses should be offered as having greatest significance for general training no one has assured us by detailed analysis altho numerous statements have been made of the values of individual subjects. The present order of frequency in the state is bench woodwork and cabinet-making, mechanical drawing, architectural drawing, carpentry, automobile mechanics and gas engine work, electricity, printing, machine shop practice, sheet metal work, machine design, and home mechanics. For purposes of common skills alone we would perhaps be able to reduce this list somewhat but to attain our five other aims all may well be retained on a list for choice and the number even extended. Where the offering is limited to woodwork and drawing there is a tendency to include wood-turning and forge work as supplements and to provide tools for use with materials other than wood. There were found rather frequently in the schools soldering outfits, tools for cement work, electric wiring outfits, and simple leather-working equipment. These supplements make it possible to extend the common skills in many practical directions.

The recent introduction of courses in home mechanics has done much to center attention on the fact that our shop projects and jobs may be more closely linked with the activities of the home and still be made to serve other purposes as well as do the traditional assignments. Too many things are being done in the school shops which average living and mixed employments will not require again to be done. There is much to commend this home repair work on furniture, screens, utensils, and electrical devices. It appeals to boys and parents as practical, fosters interest in improving the home surroundings, and brings into use a variety of the most common tools.

Farm shop courses now commonly made a part of the work in agriculture contribute greatly to the realization of our aims, especially in the development of common skills. Not only do they furnish a worth-while training experience for particular groups but they provide equipment and opportunities for observation for all boys of the school. Where special agricultural courses do not exist and farm shop work is not made a special

offering, much of the content of such a course should be worked into our outlines because the majority of our schools are at the centers of farming communities.

Carpentry has long been merely a final phase of the course in bench woodwork and cabinet-making but at present tends to take its place as a distinct elective course. Electrical work gains rapidly, particularly elementary wiring and study of home equipment. By the use of individual wiring boards, placed during class periods upon the wood benches, much worth-while instruction is being given at little initial or running expense. Many of the larger schools maintain separate electrical shops and see an outlet for whatever degree of specific training they give. Printing makes very rapid advance in introduction because of its fascination for boys, its general usefulness to all students of the school, and its ability to partially "earn its keep." Sheet metal work evidences increasing trade possibilities and gas engine and automobile work justify their inclusion because they represent an industry of extreme magnitude and great environmental elements. Pattern-making and foundry practice, now almost negligible, can not be justified as separate school subjects, except in large centers. They do, however, deserve consideration in lecture and demonstration work because they are fundamental trades. They are in the series of steps from the drawing to the finished metal part or piece.

We advise the equipment of general shops in the smaller places where tools and materials can be mixed and the courses made largely composite and advancing in difficulty. In the larger places where the number of pupils forces grouping of some kind and where there can be a greater provision of space and equipment, the individual shops will be found best adapted. It is consistent that more extensive equipment should be had and more intensive work done in towns where surroundings call for more common knowledge of all trades and more men prepared for work in any given trade. Certainly in the smaller places we shall never be committed to the policy of narrow trade preparation. Surroundings do not encourage it and the costs are prohibitive. In the larger places, especially in those towns built around one or two special industries we have no clearer duty

than provision for definite trade training. To maintain a trade school in towns of Minnesota, other than in the three large cities, is impossible; but it is possible through other means to meet the need for trained industrial workers and by the same action to meet our obligations to the large number of young men who do not enter business or the schools for professional training. Upgrading will always be done through part time and evening classes for those who find themselves more or less gainfully employed but we need facilities and plans for a boy's more satisfactory entrance to an industry and his more certain serviceableness in it. No plea is being made here for the vocationalization of our courses in whole. They must be maintained for general training ends for all boys of the school regardless of whether they look toward industrial occupations. There is, however, in most towns above ten thousand population, one industry or one industrial type outstanding and there are in all towns of this size varying numbers of students for whom trade training will seem most appropriate. Recognition of these two facts and their consideration together should lead to the selection of one or two shop courses for which the equipment and whole purpose may be intensified. Some changes in student program, period length, duration of school day and week, teacher preparation, course materials, and methods will perhaps need to be made for the special group but the general departmental scheme need not be disturbed. With such special provision added to a good general training plan we shall have basis to point with pride to the high school as a cosmopolitan and democratic institution. Co-operative agreements with industrial concerns are often made with great profit to all contracting parties. Plans, advantages, and problems of such co-operation are well set forth by Johnson.³⁰ Mr. K. G. Smith³¹ has supplied a special leaflet on the subject as suggestive for the public schools of Michigan. Mr. E. A. Wreidt³² has followed 226 Indiana boys who had had one year or more of trade training in the high schools and who left for

³⁰ BENJAMIN W. JOHNSON, *The co-operative plan of industrial education. Vocational Education News Notes* 2:9-10. 1922.

³¹ K. G. SMITH, *Industrial co-operative courses in the high school*. Lansing, Michigan: State Board of Vocational Education. January, 1923.

³² E. A. WREIDT, *Letter to superintendents, principals, vocational directors and teachers*, dated August 25, 1922. (Mimeographed.) Indianapolis: State Board for Vocational Education.

work, and has found 79 per cent of them now engaged at the particular trades for which they were trained. And we are now indebted to Leavitt,³³ Pierce,³⁴ and Barritt³⁵ for recent magazine articles on this subject. Dr. Gray,³⁶ formerly head of the Department of Economics and Political Science, University of Minnesota, in lectures before the Southern Section of the California Teachers Association, Los Angeles, 1913, set forth strikingly his belief that vocational training is for economic and social reasons a function of the public high school. We quote from page 46 of his monograph, (*italics not in the original*):

If every American child cannot have some vocational training which will fit him to earn an honest and adequate living at some service useful to humanity and to acquire sufficient income and provide himself with some leisure, our educational system is a failure. If it cannot give him this training, *together with and along side of those at present representing every rank of society, and every point of view*, the end will be class cleavage, social strife, and disaster. Let our cry be some vocational training for every child rich or poor, given under conditions that will not be narrowly technical, tending to make a workman but not an intelligent citizen, *but given together with representatives of all important vocations, so that the child of the poor man and the child of the rich man may go out into life not only with some conception of his duty and obligation to service, but with a large and sympathetic and intelligent understanding of work and happiness in all important vocations*. Nothing short of this will give us real education or universal education. Nothing less than this will make a nation of efficient workers or cultured, happy, useful citizens. Anything else leads to degeneracy, degradation, national decay, and disruption.

2. *Time allotment, length of periods, etc.* There is much difference of opinion as to the necessary or appropriate length of courses. Whole year and half-year subjects are now the rule in the smaller and in many of the larger schools. In most large systems, particularly under junior high school organization, we tend to offer units 6, 8, or 12 weeks in length. The only apparent reason for this is to cover the field of required exploration

³³ FRANK M. LEAVITT, The problem of selecting appropriate vocational courses for groups or for individuals. *Industrial Education Magazine* 24:199-201. January, 1923.

³⁴ JOHN M. PIERCE, Co-operative vocational training in a small town. *Vocational Education Magazine* 11:179-80. June, 1923.

³⁵ JOHN W. BARRITT, Co-operative education from the standpoint of the manufacturer. *Ibid.*, 1:551-54. March, 1923.

³⁶ JOHN H. GRAY, An economist's view of education: three lectures. Santa Monica, California: Board of Education.

quickly enough to permit of election and more intensive work in the ninth grade, it being the final grade for a considerable percentage of boys. The writer is of the opinion that in the seventh, eighth, and ninth grades, we should offer but 2 experiences each year or 6 in all. In this way we answer the need for variety, strengthen the courses in intensity and consequent exploratory value, and hold before those planning to leave the inducement of election and advanced training in the senior school.

The proposal of offering for these six units is as follows: 7b bench woodwork; 7a electricity; 8b sheet metal work; 8a printing; 9b machine shop practice; and 9a auto mechanics. Drawing should be supplementary to each and taught incidentally. Home mechanics projects and jobs of the farm shop type should be made parts of the courses wherever possible. All subjects to be required of all boys in these grades.

For the three upper years, each of the six named courses would be opened to election for more advanced work and the list would be extended, if only by the placing of various drawing courses on schedule (mechanical drawing, architectural drawing, pattern-drafting, machine design.) A farm shop course for special students of agriculture might be made elective for others. The course in cabinet-making might be extended to include larger building projects or carpentry might be offered as a distinct course. Class lines would be broken down. *Election* would be interpreted to mean that the student would make his own decision as to whether he would pursue industrial courses at all, as to which ones he would enroll for, and as to how much time he would spend on each. The judgment of teachers and principal would, of course, be brought to bear in personal advice and in insistence upon any clearly recognizable prerequisites.

The semester of eighteen weeks and the forty-minute period (doubled) both common in our state, may be used as the basis for discussion of total time allotment. The usual practice at present is to offer seventh and eighth grade boys one double period (80 minutes) of work each week. This gives a total of 48 clock hours per year which time is wholly inadequate and made less effective by the time elapsing between meetings of the class. Where only this amount of time can be given it is

suggested that it be used up immediately in daily meetings, by allowing one class or group to complete the 48 hours of work while another waits. This will give unity to the boys' efforts, lighten the instructor's task, and greatly reduce the expectancy of results. "Seven weeks" of work sounds much less than "one year" while in reality they are the same in this instance. Given seven weeks of daily contact with a group the teacher will show better results through the lessened effort which comes from limiting the number of individuals cared for in a given term. It would be consistent also to allow more time for the eighth grade than for the seventh, in as much as ninth graders and those above the ninth are scheduled for five double periods daily throughout the year. It may seem appropriate to maintain a 2-3-5 ratio of total time (96, 144, and 240 clock hours per year respectively). But we would urge most strongly the daily meetings for all classes, even tho the work were not scheduled throughout the year. Were the periods to be used almost wholly upon project and job work they would be none too many but used in considerable part for the attaining of ends other than skills and shop knowledges they are all too few. For groups organized for specific vocational training the half of each day should be allotted.

3. *The size of classes and homogeneity of grouping.*—We have shown earlier that the total high school enrolment increases rapidly, that the number remaining to be graduated increases even more rapidly, and that boys tend to remain longer in the high school than formerly. We find also that there is a decided increase in the per cent of boys enrolled who elect industrial courses and that they tend to elect all available units of the work. These facts point to larger and larger numbers of boys who must be accommodated. If the per capita cost in our special departments has been so comparatively high in the past that it has occasioned question as to the return value of the courses, what criticism may we not expect in the future? We must make some move toward the handling of more boys per class period. Of all classes, grade and high school, taught in the 65 towns visited, the average size was 15 boys while the range was from 5 to 28. We must change our plans to handle thirty or more boys at a

time if necessary to equalize with the academic subjects. With more of lecture and recitation work for groups and more of individual job sheets for the assignment and working through of manipulative drills we can make this change. Such procedure will also largely overcome the difficulty we now have because of overlapping. It has been shown that some fifty per cent of our high school industrial classes contain boys of different, usually higher, academic classification. These boys come into classes and naturally take a considerable portion of the instructor's time because their advanced projects require that they have attention and advice. Subnormal students often come scatteringly to the shops and add to the difficulty of instruction. The suggestion is that more attention be given to close grouping, that changes be made to permit larger classes, and that more lecture work be done. Naturally, where there is specific vocational preparation attempted for special groups the classes must be kept small. Even here the use of job sheet assignments will make possible the handling of a greater number.

4. *Equipment and physical product.*—The reader is referred to Chapter III, Equipment, Course Materials, and Physical Product and to Chapter IV, Section B, the Influence of Physical Arrangement upon Instruction and Results for detailed discussion. It was pointed out there that the shops are provided mainly with facilities for general training while a few schools have equipped some shops for more intensive trade training purposes. It was also shown that the tools and fixtures are of the best and the shop arrangement usually conducive to good teaching, with one exception. There is commonly no physical arrangement for group work of the lecture type which we feel should have a highly important rather than an incidental place in our plans.

5. *Course materials and their organization.*—The processes taught in the several shop and drawing subjects show great uniformity but their sequence is not well established. For purposes of trade training standardization in this respect is highly desirable while for objects so general as our other aims imply we are perhaps not to suffer from the mixed order of presentation. Homely jobs come to the boy and man about the home and at the average place of business in no stated sequence. By the use

of individual assignment plans and proper systems of record boys may well proceed, within defined limits, upon work calling for no rigid sequences. It is suggested that instructors get expressions from students as to what odd jobs they or their fathers are in the habit of doing and as to what other upkeep activities they would engage in if they had the assurance of a little preparation for them. For the more definite assignments of work in trade fields they will rely upon their practical experience and their teacher-training experience and upon the analyses, the suggestive course outlines, and the texts now so abundant.

Selvidge³⁷ has contributed to discussion of this problem of immediate goals. He would have us state definitely what a boy should be able to do and what he should know at the end of a course and he has provided for us a helpful list of standard attainments. He would have the pupil know why he is expected to meet each of these requirements and have him provided also with the means of checking his own progress. Bowman³⁸ has followed, in the same publication, with the results of an analysis of home activities for jobs useful as general training assignments. He presents a most valuable list, numbering 150 processes or activities. Studies of this nature and publications of such lists point toward more definiteness in our course materials. Trade analyses such as that of the machinist's trade by Allen and Cushman are a source of great help in this matter of proper selection of what is to be taught.

It has been pointed out that course outlines are not always at hand nor always complete. We do need some standardization in this regard so that a high school unit in a given field has some universal significance as to the processes learned and the information acquired. It has also been previously stated, doubtless many times, that we need clearly defined lecture outlines as well and that they should include not matters of trade knowledge alone but suggestions of occupational conditions, working relationships, and the social usefulness of skilled craftsmanship. The reader is referred for suggestive detail to Chapter IV, Section D.

³⁷ ROBERT W. SELVIDGE. Standards of attainment in shopwork (Eighth grade of junior high school.) Washington: Bureau of Education. *Industrial Education Circular* No. 17. pp. 28-30. April, 1923.

³⁸ CLYDE A. BOWMAN. *Ibid.*, pp. 30-31.

Restatement is made here of conclusion number 47 for its bearing on the materials of instruction.

It would seem advisable to use textbooks as bases for courses much more commonly than at present. Assuming that books selected for possession by students will need supplement, we believe that a fairly good text is better than none as it gives strength and organization to the work and saves the teacher's time. Reference books are few in the departments and not plentiful or well selected in the general libraries. Periodical literature is, in amount and kind, more general than vocational and materials suited to the interests of boys are in less amount than those appropriate for girls.

6. *Methods and class management.*—This subject has been dealt with at length in Chapter IV. There is need for more attention to the matter of method and a forsaking of the idea that to turn out acceptable or high grade material product is the primary aim of an industrial course. We need more teaching and less of telling and showing and helping. We need more recitation, class discussion, assigned readings, home work, examinations, and information standards. We shall profit by study of new means for individual teaching and better methods of determining the attainments of students. We must develop a more school-like atmosphere and our students must show an attitude of learning rather than of doing. These changes will come only through a better generalship on the part of instructors, evidenced in a changed manner of their occupation during the time that boys are at work. Teachers ought to indicate more clearly that they are not only mechanics hired to pass their skills in some measure to boys but that, as other instructors of the system, they are professional persons employed for the furtherance, through their chosen subjects, of worthy social aims. It will take much planning to assure that our course work will function in the development of desirable attitudes and ideals. It will tax the capacity of any teacher, however well trained, to attain in his students a regard for painstaking performance, orderly habits, a respect for the rights and possessions of others, an ability to co-operate for common ends, and an appreciation of the dignity of necessary labor; yet, these should be primary goals.

7. *Teaching fitness and schedule.*—It will be shown in our final chapter that the present teaching force measure up, in skill

attainments, to the tasks which they face. In time spent at training institutions and in actual earning experience within the industrial fields they have a much higher average preparation than is specified in the state requirements. They possess margins of industrial and scientific knowledge which we do not now make use of by reason of our close adherence to the aim of manual skills. They are well prepared to do much informational and guidance work and to plan and execute inexpensive additions to the experiences of the programs. It is suggested that in their further training, (and large numbers of them constantly extend their preparation), they turn to courses in school administration, psychology and method, economics and sociology, and the fields of related art and science. These will give a new perspective and balance to the work and promote the higher regard of their fellow teachers and administrators.

Adjustment needs to be made in the teaching schedule so that no man will be expected to meet classes each period of the day. Planning and checking is not well done under the strain of responsibility for a group of lively youngsters. The administrator who has recognized a need for free time on the part of his industrial teachers has doubtless been rewarded by a shop better arranged and cared for, improved outlines, better methods, and a brighter, happier response consequent to effective working conditions. *As a final word I would state the conviction that no change could be made that would produce a more desirable effect upon the industrial course work than the instructor's relief from the responsibilities of athletic coaching and management.*

E. SUMMARY AND CONCLUSIONS

(Numbered consecutively throughout the study. For earlier numbers see pages 26, 54, 73, 94, and 113.)

58. Our special literature, in so far as it treats of the objectives of the work, has recently undergone two important changes. Aims are now being specifically named in lists rather than buried in discussions of method, organization, and course materials. We are stating what is attempted by a given procedure rather than reviewing what has been accomplished by a completed performance. This change from statement of *claims* to statement of *aims* guides us and makes it possible for those not specialists in the field to understand our purposes and to aid in their realization.

59. Study of the judgments expressed by administrators and industrial teachers as to the objectives being attained by their industrial departments shows that these two groups are not in agreement. The teachers are much more liberal in their credit and the two groups do not stress the same aims. Of a list of nineteen aims presented for evaluation *skill in the use of common tools* was most frequently checked as attained and *specific vocational training* was least frequently checked. Personal traits and attitudes of various kinds were given high rating.

60. The writer has proposed in the text six objectives, rather closely defined, which he feels are sufficiently inclusive and clear to warrant their use in planning programs. These have been followed by statements of seven school or departmental conditions or factors which effect the realization of the aims. Discussion is made of each contributing factor to show how and in what degree it promotes or thwarts our several purposes.

CHAPTER VII

THE INDUSTRIAL TEACHER'S JOB AND PRESENT PREPARATION AS INDICES OF TEACHER- TRAINING RESPONSIBILITIES

A. THE PREPARATION OF THE 110 TEACHERS VISITED

Data on preparation for teaching were gathered by personal interviews with 110 industrial teachers. The results of tabulation are given below and should be read with consideration of the fact that our three largest cities were not included.

- 104 have completed the eighth grade.
- 96 have attended high school, 7 of them having done secondary work in normal schools and colleges.
- 92 have completed high school.
- 90 have been in attendance during Regular Years at teachers colleges, special training institutes, or higher academic institutions.
- 76 have completed training courses (73 of two years and 3 of three years duration).
- 8 have completed 4 years of college work.
- 0 have earned graduate degrees.
- 64 have attended summer sessions at teachers' colleges, special training institutes, or higher academic institutions. (Average, 2 sessions; range, 1 to 6 sessions.)
- 16 have completed extension lecture courses.
- 26 have completed correspondence courses.
- 8 have attended industrial schools of less than college rank.

The men were asked questions touching upon professional outlook and earnest of personal improvement with the results here enumerated: seventy-four men are members of the Minnesota Educational Association (general or sectional); 3, of the National Educational Association; 3, of the National Vocational Guidance Association; 2, of the National Society for Vocational Education; and 3, of the Vocational Education Association of the Middle-West. Seven hold offices or serve upon committees in these associations. Eight have contributed to the literature of our field. All but five read regularly some one of our three special journals, while few are following trade periodicals.

The amounts and kinds of practical industrial employment experienced by the men was also recorded by listing every job engaged in for a period of at least three months. The three-month amount was set as a minimum so that the summer occupations might be included for those who had alternated teaching and wage-earning. The types of this industrial experience are shown in Table XXIII. No occupation was listed unless its contribution to fitness for industrial teaching was quite clear. The amounts and spreads will be of interest here. One man had engaged in four distinct occupations, 14 men in three, 27 in two, and 48 in one, while 20 had had no practical experience. The range for the 90 men was from 3 to 300 months, the median 23.3 months, and the average time of employment at any given type of work was 27 months. (As illustrative of types of occupation not included but mentioned by the men, we cite telephone operation, work in granite sheds, railroad section labor, gardening, and work in flour mills and brickyards. No listing was made of highly educative war experiences of many of the men.)

In the absence of transcripts of credit it was impossible to determine what part of the organized school training time had been given to types of subjects, particularly academic content subjects and courses in methods and organization, psychology, and the like. The memories of the men could, however, be relied upon for a listing of the shop and drawing courses which had been completed and facts on this point appear also in the table.

In review of *preparation* we may say that three fourths of the men have had two years or more of training beyond the high school, largely professional training, and that most of the others have had what seems to be equivalent. Their average practical earning experience in industrial occupations is greater than one would have estimated. The number of shop and drawing courses pursued in schools of training is so large and the attendance time relatively so short that we conclude there must be an insufficient preparation for the meeting in their service of objectives other than skills.

B. KINDS AND AMOUNTS OF TEACHING EXPERIENCE

The periods of teaching experience of the 110 men are as follows, the present year being counted as completed.

Years	Men	Years	Men	Years	Men
1	10	7	2	13	2
2	14	8	7	15	2
3	6	9	6	17	1
4	14	10	3	21	1
5	16	11	4	24	1
6	15	12	6	7.7	Median

Fifteen men have been teachers of academic subjects before turning to the industrial field. Five have taught in rural schools and 7 have been graded school principals. Many have taught a variety of academic subjects in combination with industrial work, as follows: 21, mathematics; 12, physics; 11, American history; 11, general science; 8, chemistry; 7, civics; 6, physical education; 5, commercial geography; 5, agriculture; 4, political economy; 3, physical geography; 3, physiology; 3, trade science; 3, trade mathematics; 2, botany; 2, English; 2, commercial arithmetic and 3, commercial law. Twelve have taught evening classes, averaging 2.5 years; 3 have been employed during summer sessions at training schools; and 7 served as teachers while in uniform. This detail is shown to strengthen the suggestion, made repeatedly throughout these pages, that the grade and high school industrial classes be conducted more as are classes in other subjects. Many men are now eminently prepared through academic teaching experience to give us desirable changes in class procedure.

Table XXIII should be read as follows: In the field of bench *woodwork and cabinet-making* 101 of our 110 men have had school training, seven have been wage earners in this industry, and 105 men is the total minus duplicates. Of the 105 men, 92 have taught the subject and 89 are now teaching it, so that almost full use is made of the preparation. In some of the other subjects the training is less completely used and in others the need for training has not been met. We draw two conclusions useful here. First, in the changing from the formal to the more general and mixed type of departments and instruction now proposed, we shall have much latent ability to draw upon. Most of

our men are prepared to inaugurate the changes without acquiring new skills. In some of the subjects more recently being introduced, as sheet metal work, printing, and home mechanics, we are using what training we have and can use much more as the work develops. Second, for three types of work in particular—farm mechanics, subnormal classwork, and the instruction offered to normal training groups—our men are almost wholly unprepared.

TABLE XXIII

THE RELATIONSHIP OF TEACHER PREPARATION IN INDUSTRIAL SUBJECTS
TO THE PRESENT USE OF THE TRAINING

Common Industrial Subjects	Number of Men ^a Who Have Had Training in Them			How the Training Acquired Is Made Use Of		
	In school	Through contact	Either or both	Have taught	Now teaching	c
Woodwork and cabinet making	101	7	105	92	89	..
Mechanical drawing	95	3	96	87	75	..
Wood-turning	78	1	78	11	21	L
Architectural drawing	64	2	65	34	20	L
Farm shop work ...	3	10	11	4	15	S
Auto mechanics	41	12	50	8	14	L
Forging	70	5	72	19	13	L
Electricity	43	8	49	3	13	L
Printing	27	8	32	13	13	L
Machine shop practice	56	12	61	15	12	L
Carpentry	38	57	84	7	12	L
Sheet metal work ..	11	2	12	11	10	..
Machine design	27	0	27	7	7	..
Pattern making	13	3	15	10	7	..
Millwork, wood	71	7	76	6	7	..
Home mechanics ...	5	0	5	3	4	..
Foundry practice ...	18	3	19	2	4	..
Arts and crafts ^b	50	0	50	13	4	L
Cement work	10	8	18	9	2	..
Plumbing	24	4	25	0	0	L
Subnormal classes ..	0	0	0	19	21	S
Normal training group	0	0	0	35	37	S

^a Base, 110 men interviewed.

^b Weaving, basketry, art metal, clay-modeling, etc.

^c "L" indicates *latent* preparation and "S" a *shortage* of training.

C. SCHEDULES AND EXTRA-CURRICULAR RESPONSIBILITIES

The length of class periods varies considerably in the schools of the state although the 45-minute period predominates. The average is 47 minutes per single period and where the time is at least one hour there is no doubling for industrial work as in other cases. The number of periods in the school day also varies, the average day being of 7.4 periods and the week of 37 periods. Thirty-seven periods of 47 minutes each gives a full schedule week of about 29 clock hours or almost 6 clock hours of teaching for each day. By computation of data from the teaching schedules of the 110 men we find that on the average they are in control of groups about $5\frac{1}{4}$ clock hours each day or are teaching practically the whole time that school is in session. (Twenty-seven men have no free periods whatever during the year.) The meaning of this condition for administrators obviously is that worth while results can be expected only where there are men of unusual ability and of great missionary spirit. Its meaning for teacher-training is that longer preparation time in the institution is necessary if we are to send men out into working programs where there is no provision of time for planning. Many teach academic subjects, assume charge of study halls, etc., so that often periods scheduled as vacant are in reality extremely full.

Check of the extra-curricular service of the men brings us a little closer to a true analysis of the job. An activity does not appear in the following list unless there rests upon the industrial teacher the complete responsibility for it. (We have not shown here how many of the several duties are assumed by an individual.)

20 coach football
 29 coach basket-ball
 22 coach baseball
 19 coach track events
 1 coaches swimming
 5 have evening gymnasium work
 6 issue the school paper or annual
 3 are in charge of lunch rooms

25 are class or group advisers
 8 lead bands, orchestras, and glee clubs
 2 are treasurers for all school clubs
 2 are playground supervisors
 1 is director of the guidance program

- 7 operate the picture machine on all occasions
- 110 see to the upkeep of their departments, machine and tool condition, etc.
- 47 have some responsibility in building upkeep
- 71 purchase and install supplies and equipment

Nearly all are called upon for poster work and the design and manufacture of staging for plays, playground and track apparatus, and miscellaneous pieces of equipment for various rooms or buildings.

We conclude that the men are exceedingly useful members of the teaching force and that they are perhaps doing a disproportionate share of the extra-schedule things. From the viewpoint of necessary preparation for so varied a service we can think of few training experiences that would not be appropriate. In particular we see the desirability of training in athletic direction for those who go to the small schools where faculty men are few.

Attempt was made to classify the combinations of subjects taught. Altho most of the men interviewed give their full time to industrial subjects, many teach a variety of distinct courses. Several of the combinations and single subjects are listed, the numbers indicating the numbers of men out of 110 found teaching each.

45	woodwork and drawing	1	woodwork only
4	woodwork and physical culture	1	electricity only
3	woodwork and farm mechanics	2	auto work only
3	woodwork and agriculture	2	printing only
4	woodwork, drawing, and wood- turning	2	drawing only
3	woodwork, electricity, and auto mechanics	2	machine shop work only

Thirty-eight men had woefully mixed programs, examples: (woodwork, farm shop work, sheet metal, and auto mechanics); (woodwork, mechanical drawing, science, mathematics, and English); (mechanical drawing, home mechanics, weaving, and carpentry); and (pattern-making, foundry work, forging, and woodturning). The academic subjects appearing in combination and the teachers of each are: 5, physical culture; 4, general science; 3, American history; 3, agriculture; 3, geometry; 2, biology; 2, algebra; and 1 each of several other branches.

Bowman¹ has furnished us comparable data by analysis of the requests for teachers addressed to his institution in a recent year. We have only to conclude that inasmuch as most of our towns employ but one industrial teacher our students in training must be prepared for mixed positions. The most usual combination is woodwork and drawing because these are traditional subjects. We have shown earlier the need for adding to these two in the case of each cadet at least one other subject chosen preferably from printing, electricity, automobile work, sheet metal, and machine shop practice. Men are engaged in teaching a single subject only in large places and usually where some measure of trade training is attempted.

D. THE NUMBER OF NEW TEACHERS NEEDED ANNUALLY

The annual turnover of industrial teachers in the state has been estimated by two methods which give us results almost identical. The data used are for the entire force of the state outside the three largest cities. In one instance we start with a certain number of individuals and follow them through a five-year period to determine the number disappearing from service and the number of new teachers appearing in the list. In the second we use the position or town as the point of interest and show the lengths of time the position has been held by each incumbent. (Lists for this work covering the past five years were kindly supplied by the State Department of Education.)

FIRST METHOD:—We begin with 197 men employed in the state in the school year 1919-20 and follow them to the present. In the second year there remained 150 of them, the next year 118, the next 102, and in the fifth year 81 only. By placing immediately into computation the new individuals of each year, we have the following figures:

1919-20—197 individuals employed outside the three largest cities.

1920-21—117 in same position, 25 changed positions, 55 quit teaching or left the state, 68 new individuals. Total employed, 210; gain, 13.

1921-22—210 individuals of the previous year. 140 in same positions, 14 changed positions, 56 quit teaching or left the state, 72 new individuals. Total employed, 226; gain, 16; total gain, 29.

1922-23—226 individuals of the previous year. 157 in same positions, 13 changed positions, 56 quit teaching or left the state, 49 new individuals. Total employed, 219; loss, 7; total gain, 22.

¹ C. A. BOWMAN, Analysis of 286 calls for teachers (Stout Institute). *Industrial Education Circular* No. 17, pp. 7-9. April, 1923. Washington: United States Bureau of Education.

1923-24—219 individuals of the previous year. 165 in same position; 10 changed positions; 44 quit teaching or left the state; 35 new individuals. Total employed, 210; loss, 9; total gain, 13. Average new individuals each year, 56. Average annual gain, 3 men. Annual need estimated, 60 men. (Outside the three large cities.)

SECOND METHOD:—As to the length of service in each position held in this state we have the following for a five-year period:

60 men—5 years or more	5 men—2 years and 2 years
36 men—4 years and 1 year	10 men—3 years and 1 year
10 men—3 years and 2 years	34 men—3 years
2 men—2 years, 1 year, 1 year, and 1 year	19 men—2 years and 1 year
2 men—2 years, 2 years, and 1 year	81 men—2 years
1 man—3 years, 1 year, and 1 year	13 men—1 year and 1 year
2 men—4 years	131 men—1 year

Total individuals employed in the five years, 406. Average employment in each position, 1.9 years. $406 \times 1.9 = 771.4$ school years served by them. Average number of positions in state each year, 212. Five years $\times 212 = 1060$ school years to be served. $1060 - 771 = 289$ years difference total, divided by 5 = 58 years annual difference or 58 men needed each year without natural increase. Annual estimated need, outside the three largest cities, 60 men. Total need for state estimated at 100 men. For this number, therefore, our teachers' colleges and the university, with the aid of outside training centers, must accept responsibility and perfect their plans.

E. SUCCESS FACTORS AND THE TRAINING PROGRAM

If we will, for the moment, disregard the influences of native endowment and personal attractiveness on teaching success, we shall admit that those in our profession who enjoy distinction are those whose preparation has been strong. We believe that ultimate success in the profession and the time necessary to attain one's greatest usefulness in it are dependent in large measure upon early and continued specific training. These conceptions have not been generally entertained by those in the field of industrial education. War conditions forced and certain other considerations have augmented the assimilation by our fraternity of men trained for service in the industries. We can point to notable success in the cases of many individuals who have taken this route to school positions, but on the whole the experiment has not been satisfactory. We shall continue so to recruit for the strictly trade training positions but for the more varied and general course work with grade and high school boys we shall exact

institutional training as a warrant of breadth and teaching consciousness.

To try to transfer one's interest from production to the intangible results expected from schools is to attempt no easy task. There is too great a gap, too profound a difference. In the factory things are made after specifications; the product can be handled, checked with the plans, changed, and, if need be, "scrapped." The finished part or piece or job can be followed and watched in its functioning. If error be found, no greater harm will result than the loss of a job by the workman or a decreased patronage by the firm. Incompetence usually means loss of dollars or vexing delay and occasionally injury and death. In the school, on the contrary, we have no definite specifications for product. Our results are in the last analysis unmeasurable. We can not "throw out and forget" a percentage of spoiled pieces; neither can the materials work back to the raw and come through again for better handling. In cases of error the workman, the teacher, seldom suffers and officials can not well be held to account, for competition is not sufficiently compelling and there is little apparent use to check. The misfit boy alone suffers in that he is underdeveloped or prepared for a condition which he does not meet. The result is his personal loss of reward and interest and happiness, often for his lifetime. The cases are not parallel; productive industry experience and the teacher-training experience are fundamentally different. Ability to do the shop task is not preparation for classroom service; often such ability is really unfitting, for some habits and attitudes must be lived down before more desirable ones can begin to develop.

A teacher must know the subject-matter to be presented. He must be acquainted with the nature of youthful minds. He must be able to recognize individual differences and capacities. He must aim to develop full powers in each pupil of many groups, avoiding studiously what may limit the unfoldings of nature. We do not seek a common performance; our business is to maintain in people their primary differences and to make them even more different. The teacher must realize that youngsters, all of us for that matter, are but machines after all, so constituted that they react in certain precise ways to situations met. He must know

upon what laws of learning he can base economy of effort. He must be able to discern student types and be skilled in group study and the devising of courses for special situations. He needs to know the various kinds of lessons and which one is most happily chosen in a given instance. He must possess abilities in the fields of discipline, departmental management, and general whole school helpfulness. These knowledges and appreciations can not be adopted quickly and are best acquired through extended residence in institutions where the atmosphere is a teaching atmosphere.

In the year 1922 the writer made a study of teaching fitness for industrial positions, parts of which study were reported in a series of articles.² He found ten characteristics most frequently held in mind when judgment was being made in supervision or in the examining of candidates for positions. These ten characteristics or criteria are: adaptability and tact, executive ability and class management, general scholarship, knowledge of the subject taught, good character, personality, health and appearance, understanding of methods, professionalism, and industrial experience or contact. Reference to the articles will show how the qualities were rated by some three hundred competent men and that these men do not consider the qualities in the same relative order for teachers of all types of industrial and vocational work. An evaluation of each characteristic as effective for each type of position was attempted in conclusion.

Classes of Courses	Averages		Ranges	
	Two-year curricula	Four-year curricula	Two-year curricula	Four-year curricula
	Per cent	Per cent	Per cent	Per cent
Content academic	28	35	6-70	15-57
Content shop	26	24	7-44	10-44
Content drawing	14	10	0-36	4-19
Methods and supervision	7	6	0-17	0-21
Observation and practice	8	2	0-22	0-8
Administration	5	8	0-15	0-20
Educational psychology..	5	3	0-16	0-10
Educational sociology...	1	1	0-5	0-5
Electives	6	11	0-37	0-32

² Industrial and vocational teacher-training. (A series.) *Industrial Arts Magazine* 11:333-36; 389-92; 417-21. September, October, November, 1922.

As a part of the study mentioned a canvass was made of 25 two-year and 25 four-year industrial teacher-training curricula then in use throughout the nation and the facts were set forth in Table VI in that series, under the title—*Two-Year and Four-Year Curricula Compared—Classes of Courses and the Averages and Ranges of Percentages of Credit Required in Each Class*. That table is copied on the page just preceding.

By the aid of these data the "Minnesota" training program was somewhat revised and now stands as shown following. It is hoped that the present study will effect even more appropriate changes and suggestions to this end are made in conclusion.

FOUR-YEAR CURRICULUM IN TRADE AND INDUSTRIAL EDUCATION
COLLEGE OF EDUCATION—UNIVERSITY OF MINNESOTA

NECESSARY FOR GRADUATION, 180 QUARTER CREDITS
REQUIRED OF ALL, AS HERE GIVEN, TOTAL 115 CREDITS

Content and Generally Professional Subjects

- 15 English (rhetoric)
- 5 Introduction to sociology and 3 educational sociology
- 10 Principles of economics and 3 labor problems
- 6 General psychology, 3 educational psychology, and 4 educational diagnosis
- 3 History of education
- 3 Technique of teaching
- 3 Educational administration
- 2 Graphic presentation
- 15 Shop work and 10 drawing

Special Field Courses

- 2 Occupational analysis, 2 job analysis, and 2 selection of related materials
- 2 Industrial history
- 2 Literature of industrial education
- 2 Social agencies in education and 2 social significance of vocational education
- 2 Methods in shop subjects, and 2 methods in related subjects
- 6 Practice teaching
- 6 Administration of vocational education—all day, evening, and part time—
2 each

CONTROLLED ELECTIVES—18 CREDITS SPECIFIED FOR EACH GROUP NAMED
Manual training or general industrial training teachers
Teachers of special shop subjects for boys or girls
Related subjects teachers

Teachers of non-vocational (related academic) subjects
Co-ordinators and directors of part time schools and classes
Directors of day and evening industrial schools
Supervisors of industrial education for cities and states
Directors, assistants, and field workers in vocational advisement

FREE ELECTIVES—47 CREDITS

Shop work and drawing combined, already 25 credits by compulsion, may be elected to the extent of 20 more credits. The limit for these subjects is 45 credits or one fourth of the four-year requirement. Special methods courses in any shop or drawing subject for special groups of students may be pursued as free electives. Advice is offered aiming to prepare each individual properly in the fields of mathematics, science, art, vocational psychology, general school administration, and the organization and supervision of general industrial training. A graduate seminar course is conducted for the consideration of research projects.

RECOMMENDATIONS

1. That we continue the four-year curriculum, do *not* set up another of less duration, and that in conference with the State Supervisor of Trade and Industrial Education we designate courses best adapted for meeting the two-year general requirement and the special Smith-Hughes requirements for certification. These designations should greatly reduce or completely discard the present "controlled elective" groups which are difficult of administration because of the limited numbers qualifying in each.

2. That we provide new training facilities as follows: in co-operation with the Department of Agricultural Education, a course in farm shop work; in connection with the University High School, courses in home mechanics, printing, and metal work.

3. That we co-operate with the engineering colleges for the closer organization of shop and drawing courses for our students, if possible in separate classes, so that methods and outline work may be emphasized. That we seek to offer an elective *practice* class to University High School boys in metal work or electricity at the engineering buildings.

4. That we continue the co-operative agreement with the Dunwoody Industrial Institute, both day and evening, both academic year and summer session. We have here the opportunity

to get courses for which no department of the University is equipped and which very closely parallel the conditions of industrial employment. These courses are advised for those teachers, particularly, who expect to do vocational training service in the schools.

5. That we continue the schedule of late afternoon and Saturday morning lecture courses to accommodate teachers employed in the Twin Cities and nearby towns but that we gradually increase the offering during earlier periods of the day.

6. That the courses in Organization and Supervision of General Industrial Training, the Junior High School, and Vocational Psychology, now advised electives, be made required subjects in our special curriculum. That the shop course now pursued by those who are in training for work with subnormal children be stressed.

7. That we plan a new course in related art to be a required two-credit unit, so that our teachers may be prepared in art relationships for both the improvement of projects and the lecture side of the work.

8. That we plan a new course in occupational information, guidance, placement, follow-up, etc., or that these subjects be assigned much more time than at present in other courses.

9. That by an extension course or two each year we carry our materials to those parts of the state where groups sufficiently large can be met. That advice as to correspondence instruction continue as at present, i.e., confined to the first two years of the program and to subjects for which texts are available such as English, economics, sociology, mathematics, general psychology, industrial history, and history of education. A course in personnel management or foremanship should be carried to the state by these extension or correspondence activities and should appeal to some few men and women in each of the small manufacturing firms. Vocational education being impossible for the recruits to many of these types of employment, there devolves upon the foreman and superintendent the full training responsibilities.

10. That co-operation with the department of Physical Education for Men be extended so that electives in athletic coaching and management may be conveniently scheduled by our students.

11. That as our number of residence students grows we seek practice teaching privileges in the junior and senior high schools of the Twin Cities, in the Minneapolis Vocational School, the St. Paul Vocational School, and Dunwoody Institute.

12. That we adapt our program for the greater help of those who will serve in institutions and classes for the training of girls and women for industry. The fact that the University provides a Department of Home Economics Education has led us to confuse the two and to neglect the one.

13. That we consider carefully the possibility of credit for teaching experience and credit for actual industrial experience. In as far as these two are recognized as credentials and as elements of fitness we should plan to assign them tangible credit in the training program. It is also conceivable that we should *arrange* industrial contacts for our men in training and credit these, upon guarantee of their providing certain amounts of time on specified processes.

14. That we apply ourselves as a department and college to a study of the problems of general industrial and vocational industrial education, particularly on the definition of units, group and individual methods, and grading and record schemes. At the earliest convenience there should be proposed a graduate major or minor in this special field.

15. That the Bureau of Educational Research of the College of Education prepare reading lists and bibliographies in vocational education for the use of teachers and administrators of the state and that closer contacts be arranged also by the college Committee on Appointments.

16. That the college continue its support of industrial education conferences in connection with meetings of the general and regional M.E.A., the Principals' and Superintendents' Short Course of Schoolmen's Week, the Twin City Vocational Club, the Manual Arts Club of St. Paul, and the Minneapolis Division of the National Vocational Guidance Association.

17. That a small amount of money be held available for use by members of the department when they may be called by principals or superintendents to study and advise on the programs in their cities.

F. SUMMARY AND CONCLUSIONS

(Numbered consecutively throughout the study. For earlier numbers see pages 26, 54, 73, 94, 113, and 136.)

61. The industrial teachers now employed in the schools of the state, outside the three largest cities, have had two years of special preparation beyond the high school. Before entering the profession and by vacation employment they have averaged approximately two years of total practical industrial contact. In their teacher training course work they have emphasized the skill and trade knowledge elements. We believe that a four-year training period is necessary for a more balanced general preparation and especially for a more thoro acquaintance with problems of methods, supervision, and school administration.

62. The median amount of teaching experience for 110 men is 7.7 years. A large number have taught academic subjects for considerable periods and are therefore prepared to give us desirable changes in class procedure. We need only a changed viewpoint in most instances for the more certain attainment of objectives other than skill.

63. Considering school courses and practical experience in the various subjects and checking this preparation against the present teaching activities of the men we find much latent ability which should be used for expansion and enrichment of the offering. We find also a few subjects for which the training is wholly inadequate. (See Table XXIII.)

64. The teaching schedules of the men are much more full each day and week than is desirable for effective work. The instructors, through their extra-curricular activities, have need for great diversity of preparation and particularly for training in coaching and managing athletic teams.

65. Teaching positions in great part are of the combination type. Some men will be needed who can teach an academic subject or two in connection with the manual work. Few will be needed for one shop course alone, and these only in the largest schools where intensive work is done. The major call is for the man who can instruct in woodwork and drawing and at least one other subject such as printing, electricity, machine shop practice, farm mechanics, and automobile repair.

66. The annual estimated need of new teachers for the positions of the state outside the three large cities is sixty, based upon data covering a five-year period. The total estimated need is one hundred men a year. The teachers' colleges, the University, and more distant institutions must supply this number.

67. We believe that the type of service most commonly required of industrial teachers in this state presupposes strong initial preparation in institutions recognizing their functions to be training for teaching. There will be some vocational training positions for which trade experience is a necessity and provision has been made for short preparation units for

artisans transferring to our branch of the profession. For the more general and extremely more common positions we feel that four years of training is needed and, for other reasons, highly desirable.

68. A standard curriculum for all teachers is not adequate; neither is one standard offering for all types of industrial teachers sufficient. Differentiation must be permitted through advised electives after certain constant courses have been completed. The four-year curriculum in Trade and Industrial Education at the University of Minnesota is shown in full in the text and is followed by suggestions of change in its content and administration.

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